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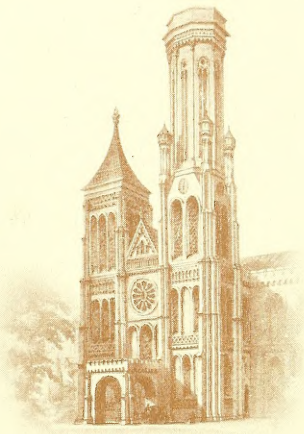

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THE NATIONAL GEOGRAPHIC MAGAZINE

LITTLE-KNOWN PARTS OF PANAMA

BY HENRY PITTIER

AUTHOR OF "COSTA RICA—VULCAN'S SMITHY" IN THE NATIONAL GEOGRAPHIC MAGAZINE

THE usual tourist, fresh from a visit to the gigantic work now nearing completion between the cities of Colon and Panama, will tell of his occasional glimpses of the virgin forest and of his experiences with the natives, supplementing his narrative perhaps with pictures of the jungle and of what he took for aboriginal Indians.

In fact if our friend has followed the customary route, limiting his itinerary to a train ride from Colon across to Panama, with stops at Gatun and Pedro Miguel, to inspect the locks, and at Culebra to see the big cut, he knows very little of the real country, and in ninety-nine cases out of a hundred his native Indians are likely to have had kinky hair and African features.

There is, undeniably, plenty of jungle and thicket along the future canal, but it is almost wholly second growth; and in those places where the primeval vegetation has been spared, as in the swampy lowlands between Gatun and Bohio and on the steeper declivities of the hills, it is and has always been more or less stunted and scarce and so does not give an adequate idea of the majestic forests that still cover about two-thirds of the territory of the Republic of Panama.

If, however, our tourist is a man of leisurely habits, a stranger to the hurried ways of the present generation, he may leave the beaten track, pick up the wanderer's stock, and go tramping over the excellent roads built parallel to the railroad and the canal by the government of the Canal Zone. He will then meet occasionally some last vestiges of the aboriginal vegetation and examples of the wonderful rankness of tropical plant life.

Not far from Pedro Miguel, on the way to Panama, stands a cluster of Cavanillesia trees, once part of the forest, but today shading a pasture (see picture, page 632). Apart from the striking effect of their huge straight trunks, which are out of proportion with their insignificant flat crowns, these particular specimens are of especial interest on account of the fact that they grow nearly at the extreme northwestern areal limit of the species. Eastward, in Colombia, it seems to reach the Magdalena River, and southward it can be followed along the coastal plains as far as Peru.

It may be interesting to add that the fruit affords a good example of the wonderful contrivances by means of which nature insures the propagation of the species. The fruit is an elongate spindle, provided with five broad wings and very light, so that it travels easily far away from the parent tree. The small seeds are imbedded in the woody tissue of the spindle, and the surrounding cells are filled with a gum which readily absorbs available moisture and swells to a

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SKETCH MAP OF PANAMA, SHOWING GENERAL FEATURES AND PRESENT LOCATION OF ABORIGINAL TRIBES

considerable extent. When the fruit reaches the ground, the seeds thus find themselves at once immersed in an overflowing, gelatinous mass of gum, which furnishes the water necessary to the first stages of germination.

Another vegetable wonder that grows among the bushes on sandy flats along streams is often detected by the delightful odor and the yellow bright color of its singular fruits. It is the candle-tree, now introduced into most botanical gardens of the tropics, but a native of the central part of Panama.* The beautiful *Gustavia superba* should also be mentioned as a special feature of the Isthmian flora.

In thus wandering across country, instead of keeping exclusively to railroad trains, the traveler will have occasion many times to wonder at the incredible luxuriance of vegetable life in general and to observe the never-ending struggle for supremacy.

As to the real Indians, he may succeed in getting a look at some male specimen along the wharves at Colon or around the market in Panama City; but the chances are that they will mostly pass unnoticed in the motley crowd of mixed races of the larger towns. At least eight-tenths of the native inhabitants of the Republic show to a more or less marked extent the stamp of African blood, and the most extraordinary cases of interbreeding are observed everywhere.

East of the canal, however, and not taking the aboriginal tribes into consideration, the negro element vastly predominates, the settlements of Porto Bello, Nombre de Dios, Palenque, and Viento Frio, on the Caribbean Sea, being formed, as it seems, by descendants of both West Indians and Spanish slaves, and the villages of the Pacific coast—Chepo, Chiman, Garachine—and those in the Tuyra basin by the latter only. West of the canal the predominance of the African element becomes less marked, at least on the southern side of the country, as one goes farther toward Chiriqui, where the whites and the civilized Indians have the upper hand.

Panama is hardly a country for mountaineering, most of its area being below the 3,000-foot contour line. The highest elevations are in the western part, which is an extension of the Costa Rican system. There the Chiriqui Peak, or Volcan de Chiriqui, as it is more commonly called, attains 11,000 feet and is worth ascending. Farther eastward and on the main divide several bold peaks can be seen from both coasts; they very likely reach the 10,000-foot line, but they have never been ascended and their exact altitudes, names, and even their true geographic position are still to be recorded.

The same can be said of the easternmost group of high ranges, on the Colombian border, an undeciphered mass of domes and peaks, which have never been explored and whose real relation to the western Cordillera of Colombia has never been ascertained. It is almost certain, however, that they form an independent system, and that the old notion of the South American Andes forming also the backbone of the Central American Isthmus should no longer appear, as it often does, in modern writings.

From the naturalist's standpoint these highest mountains at both ends of the Panamanian territory are of special interest. As few or no collectors have ever visited them, they are likely to be the abode of many unknown forms of both vegetable and animal life. They are also the most advanced outposts of the fauna and flora of the neighboring countries. Besides, they are attractive even to the ordinary tourist, on account of their beautiful scenery and of the marvelous changes observed within a few hours as one rises from the lower to the upper regions, experiencing at the same time a corresponding variation in climatic conditions. This is best seen in the ascent of the Chiriqui Volcano, the summit of which can be reached in three days from David, by way of El Boquete.

ASCENDING THE CHIRIQUI VOLCANO

David stands at about 12 miles from the seashore, in an open, slightly undulating country. It is one of the most rapidly improving towns of Panama, on account of the varied and abundant resources offered by the surrounding country and the affluence of foreign,

*See NATIONAL GEOGRAPHIC MAGAZINE, vol. xxiii, p. 124, 1912.

Photo by H. Pittier

A FOREST GIANT OVERLOADED WITH VINES, IN THE FOREST NEAR NOMBRE DE DIOS, PANAMA: NOTE THE MAN

mostly American, settlers. The tidal belt ends in the neighboring bottoms, and the plain between the sea and the first hills is subdivided into two or three terraces, the highest of which is about 150 feet above sea-level.

The deep ravines, cut through these terraces by the many streams descending from the mountains, allow an insight into the recent geological history of the district. Thick layers of a fine sand, almost horizontal and apparently devoid

of organic remains, show that the whole plain is an ancient sea-bottom, uplifted at a not very remote time either by some sudden cataclysm, or insensibly by the slow process that governs the emergence and subsidence of coastal lands all over the globe.

In former explorations, in the adjoining part of Costa Rica, I have noticed the same indications of a general upheaval, the neck of the Osa Peninsula still showing unmistakable evidences of a recent broad sea-channel, and bluffs, bearing the peculiar relief due to the action of the waves, lifted to nearly 300 feet above sea-level.

Most of the flat country about David is utilized as grazing land, and during the dry season it is constantly swept by the strong trade wind, reaching over the mountains through the deepest depressions of the Cordillera. Only in sheltered places along the rivers, behind the knolls that rise here and there, and around the houses, is there any show of arboreous vegetation, among the most conspicuous representatives of which may be cited the algarrobo and the corotú. The tamarind and mango, two East Indian trees now naturalized all over the tropics, and the native wine and plum palms, are the trees most generally seen around the houses. Extensive forests, displaying the luxuriance and generous proportions of real tropical vegetation, are found only at some distance to the west, on the lands adjoining the Chiriqui Viejo River, or to the east between Gualaca and Horconcitos.

Going north in the direction of the Chiriqui Peak, one is soon struck by the peculiar range of low hills running, as it seems, between the plains and the mountains and parallel to the sea-coast. The road winds between these and, mostly following the Dolega River, ascends gradually toward El Boquete. The general incline is so insensible that one travels nearly 25 miles before reaching the foot of the volcano, at an altitude of about 3,000 feet. The ride is mainly across savannas or through what ecologists call a parklike landscape.

During the dry season the long stretches, bare of arboreous vegetation, are constantly swept by the north trade wind, which attains its major intensity between 9 o'clock a. m. and 3 o'clock p. m., and is often of such violence that even the horses find it difficult to stand and to proceed on their way. Every detail of the surrounding landscape bears the impress of the wind. In the most exposed places the surface of the soil is submitted to an active aërial erosion, the minute particles of the ground being whisked away the moment they become loose.

The meager sod is characteristic in appearance, consisting not of a continuous carpet of grasses, as in most savannas, but of isolated tufts of sedges and small plants (mainly Leguminosæ and Rubiaceæ), distinguished by the unusual development of their root system.

Many an acre is absolutely bare, and at places long stretches of stones, running from north to south, are explained by the natives as being remnants of former eruptions of the volcano. They are really what is left of low ridges demolished by the wind.

In hollow places, as along the dry bed of creeks that flow only during the wet season, the trees show some attempts at congregating in small groves; but they have a stunted appearance, their trunks are twisted and knotty, their limbs few, and all strikingly growing in a southerly direction (see page 636).

The few head of cattle browsing through these thinned savannas are shaggy, and even the people and their dwellings, the former with their large hats tied upon the head and the latter with roofs half gone or mended temporarily with the leaves of the native royal palm, show the permanent action of the wind.

Not to impress the reader too deeply with the dreary barrenness of the country, it should be added that the south-side exposures of the hills and the deeper valleys offer sheltered nooks, with prosperous villages surrounded by patches of grassy pastures and of forests.

Through this rather desolate region several rivers have cut deep, narrow canyons, in which subtropical vegetation is mixed in a curious way. Oaks are seen growing next to palms, giant elms

Photo by H. Pittier

CAVANILLESIA LANDSCAPE NEAR PEDRO MIGUEL: CANAL ZONE

Besides their interest as a remnant of the primeval forest, these trees grow nearly at the extreme northwestern areal limit of the species, which is mainly a feature of the South American Pacific coast (see page 627)

mingling their branches with those of towering ficus, and, among herbaceous plants, clematis and nettles side by side with showy bignonias and fragrant epiphytic orchids. Bathed in the perpetual but never excessive dampness of the foaming river, sheltered from wind and strong nightly radiation by the high surrounding walls, and with an atmosphere incessantly renewed, the hidden recesses of these gorges assume, indeed, a singularly beautiful appearance. They are, however, difficult of access, and not only teem with insect life, but offer favorite refuge for snakes, which are attracted by the latter and by the many small mammals.

Near El Boquete the road leaves the savannas to penetrate into the upper Caldera Valley. This is the favorite summer resort of the Panamanians and of many Canal Zone Americans, and also the only coffee-growing section of the whole Republic. On account of the prohibitive tariff, the latter is one of the best paying products of native agriculture, and several foreigners have established here prosperous plantations. But El Boquete, half in the windy, semi-arid zone and half in that of continued rains, has a very limited producing capacity, and cannot by far supply the rapidly increasing coffee consumption of the larger centers. It is not equipped, either, for a summer resort, as the "Hotel de Lino" is simply a farmhouse, where abundant meals and a kindly hospitality are the welcome but sometimes inadequate compensations for the lack of worldly comfort.

To the lover of nature, however, the surrounding forests are forever a source of healthy enjoyment, among which orchid hunting is not the least exciting. Several of the most highly prized species hide on the moss-grown trees, and often their exquisite perfume is the only indication of their near presence. Now and then the eye is attracted by white or pink patches of Trichopilias, or by the curiously shaped although less conspicuous flowers of some Catasetum (page 641).

The visit to the Chiriqui Volcano is usually made from here. It is an 8,000-foot ascent to the top and is scarcely to be recommended to ladies. Not that it offers any danger or even chances of dramatic situations, but it is a straight and exhausting climb, rendered difficult at times by the unsteadiness of the loose soil, the intricate thickets, and, even in the upper belt, by high, tangled grass-fields. Rocks, all of volcanic origin, are seen only in deep gorges or near the top; snow and ice are out of the question; and, though still called a volcano, the Chiriqui Peak is a dead one, in which only obsolete traces of former plutonic action are to be seen.

Still, the ascent is worth while, if made at the right time. The trail leads first through savannas and beautiful oak forests, mixed with sweet cedars and other subtropical trees, and as it goes higher and higher, always straight toward the top without any superfluous windings, the attention of the traveler is distracted from his toilsome physical exertion by the successive appearance, in the middle of a strange vegetation, of many familiar-looking plants, like trailing bramble vines loaded with luscious blackberries, less welcome nettles, just like those seen around old farm-houses in northern climates, alders, and the like. A formal investigation of the flora of the upper mountain belt would show, in fact, that it is a mixture of a reduced endemic element with representatives of the flora of our northern countries and of the South American Andes.

It may be interesting to mention here that along the trail, between two and three thousand meters of elevation, there are whole forests of a Persea tree, which is a very near relative to the alligator pear. It grows below and above the frost-line, and we have repeatedly advised its acclimatization in California, where it could perhaps be used as a grafting or budding stock. On account of its hardiness, it is not unlikely that by its means the extreme limit of alligator-pear cultivation could be shifted a good distance northward.

The long ascent to the top is not made in one day. There is a first camp in a picturesque gorge, about half way up from El Boquete, and then another at the bottom of the large northern crater,

Photo by H. Pittier

Cavanillesia platanifolia, ONE OF THE MOST BEAUTIFUL TREES OF THE ISTHMUS
The wood, however, is spongy, as light as cork, and apparently useless

Photo by H. Pittier

Cavanillesia platanifolia, THE CUIPO-TREE

The two vertical dark lines are termite tunnels, showing that not even these giants of the tropical forest are safe from the attacks of the destructive white ant. The boy at the left is the author's son and companion.

in one of the nooks formed by the narrow gorges leading to the highest summit. Here the temperature goes every night near or below the freezing point, and the cold is very intense to people accustomed to the heat of the lower plains.

But during the dry season the air is so crisp and pure, the sky so blue, the song of the thrushes and of many other familiar little birds so pathetically lovely, and the beautiful surrounding nature so exhilarating, that one easily forgets small bodily inconveniences to enjoy with full heart the beauty of it all.

The crater is a circular plain about 2,000 feet in diameter, surrounded by a more or less broken ridge that is densely covered with a forest of myrtles, oaks, and less familiar trees. The culminating peak is distant only about two hours' climb, and as one approaches it the arboreal vegetation becomes more and more stunted and dwarfed, until it completely

Photo by H. Pittier

THE TREE-LIMBS ARE ALL STRIKINGLY GROWING IN ONE DIRECTION (P. 631)

disappears, to give place to rocks and grassy slopes.

In clear weather the panorama from the summit is splendid: to the south, the vast expanse of the Pacific and the beautiful lowlands of Chiriqui, all interlaced forests and savannas; to the north, a labyrinth of unexplored valleys, covered totally by virgin forest running down to the Caribbean Sea; westward, the Costa Rican mountains familiar to the writer; and to the east, many a lofty peak of no despicable prominence and virgin yet of any white man's footprints. In our ascent we had only glimpses of all this, as a thick fog was gathering at the time. From the top we had only a momentary vision of a far-looking silvery ribbon, the Rio Chiriqui Viejo, several thousand feet below us to the west.

The return trip can be effected easily in one day.

THE ABORIGINAL TRIBES OF PANAMA

Our tramp through Panama now takes us to scenes quite different from those we have just described, among what is left of the aborigines of the country.

In the years 1501 to 1503, when Rodrigo de Bastidas and Christopher Columbus visited the northern coast of the Isthmus, they found it densely populated. About ten years later Balboa met with identical conditions along the southern coast, and all subsequent reports of early explorers give evidences of the fact that the whole country was in possession of numerous clans, the names of many of which have been preserved.

The two principal nations were the Guaymies, extending from the Chiriqui Volcano eastward to what is today the Canal Zone, and the Cuna-Cuna, on the opposite side of the Isthmus. West of the volcano, in the valleys of the Chiriqui Viejo, Chánguena and Diquis rivers, and possibly a little farther east, along the Pacific Ocean, were the Dorasques, a warlike and more civilized race, to whom the beautiful pottery and the gold ornaments found in the ancient graves of Chiriqui are often attributed. As can be deduced from these relics, the Dorasques had trade relations with the Niquirans and Chorotegans, of Costa Rica, and through them felt in some degree the influence of the Nahuatl, in far-away Mexico. Today they have completely disappeared as a tribal entity.

On the southeastern border of the present Republic of Panama dwelt the Chocoes, who are still numerous and extend from the Pacific coast northward to and even beyond the Atrato River. They formed a kind of buffer state between the Central and South American nations.

In the course of my work I had the opportunity of spending many weeks among representatives of the three groups still in existence—that is to say, the Guaymies, the Cuna-Cuna, and the Chocoes.

THE GUAYMIES

Up in the forbidding mountains and valleys that form a background to the landscape for the traveler on the steamers plying between Panama and David dwell the mass of the present Guaymies, about 5,000 in number, in their homes scattered through savannas and forests. From the time of the conquest to the beginning of the past century, they have been more or less under the influence of Catholic missionaries, but have since been left to go back to most of their ancient customs and ways of living.

Among the few vestiges left of that transitory semi-civilized condition under

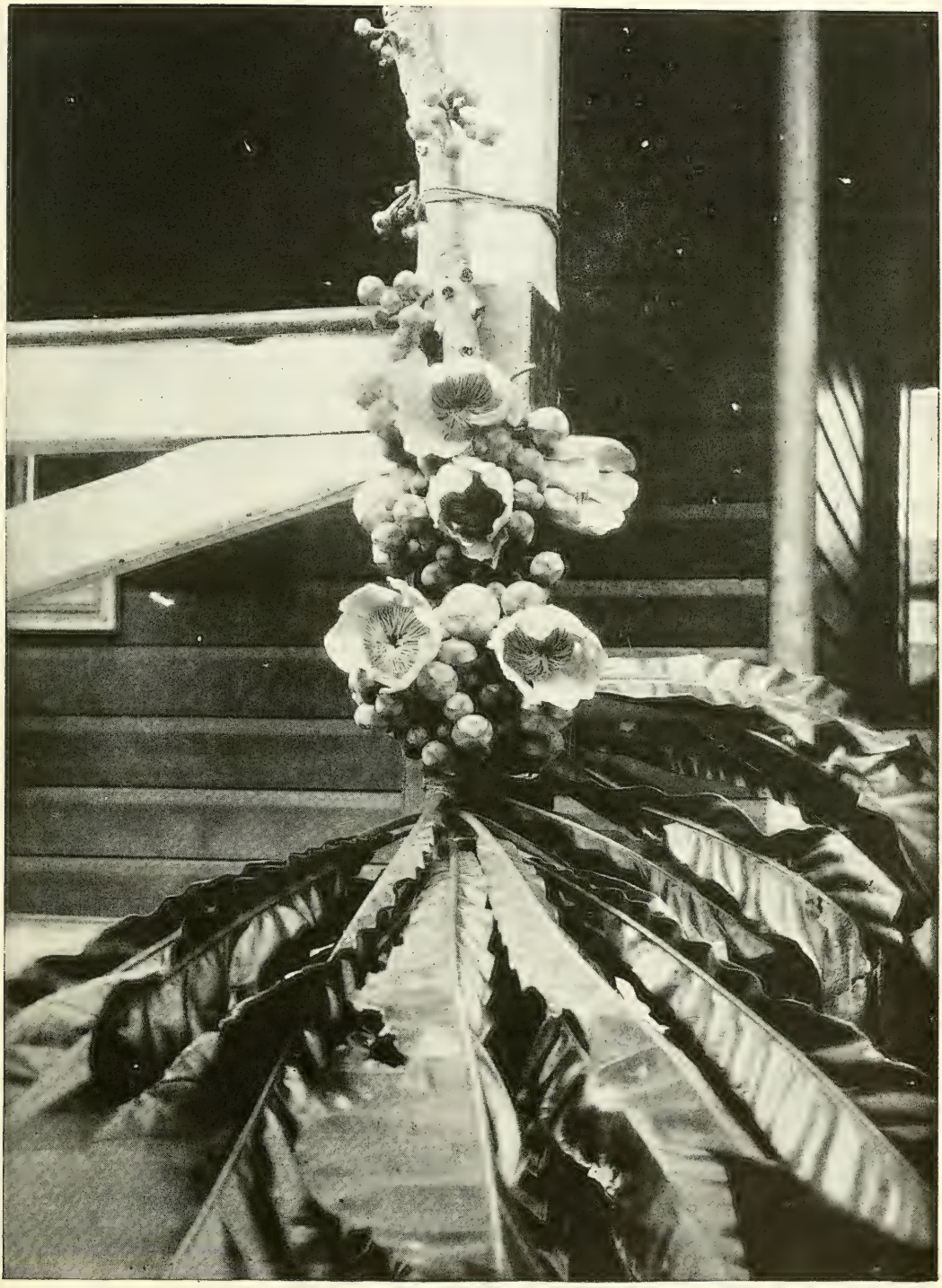


Photo by H. Pittier

A BUNCH OF FLOWERS OF *Gustavia superba*, ABOUT ONE-SEVENTH OF THEIR NATURAL SIZE

Photos by H. Pittier

TERMITE NESTS IN THE SAVANNAS NEAR AGUADULCE (VERAGUAS), PANAMA

They are built originally around the stem of some young tree, which soon disappears, while the solid, dolmen-like columns stand indefinitely against wind, rain, and drought

Photo by H. Pittier

PROVISIONAL SUMMER ROOF, MADE OF THE LEAVES OF THE NATIVE ROYAL PALM *(Attalea gomphococca)*: NOTE THE LONG PALM LEAVES

religious discipline, perhaps the most conspicuous is the flowing gown of the women, tight at the neck and reaching down to the feet. In every aboriginal tribe committed to their guardianship the first care of the pious fathers seems to have been to create among those simple creatures not the sense of modesty which is innate among them, but a feeling of shame of their physical beauty.

This is why in countries with a constantly warm climate, and where the rugged topography, the predominance of brush and bush, and the multiplicity of rivers make necessary only the scantiest clothing, we often see the poor females moving awkwardly in their cumbrous imposed garments, under which, however, they still wear the primitive and more practical bark skirt. It is true that when there is no stranger near the gown is mostly discarded, and if a rain-shower surprises a caravan on the trail the women quickly strip, wrap their togs in a large Calathea or Heliconia leaf, place the parcel in their load, and then continue on their way.

The men do likewise, and besides when they go on a hunting expedition they invariably abandon their trousers before starting on a run after some wild animal. This practice has been adopted by the other more civilized native in some parts, and sometimes one discovers a whole collection of blue trousers hanging on the lower branches of some tree at the opening of a forest path. In this case the shirt that forms the only other part of the male wearing apparel is taken off and tied around the loins.

The Guaymies are usually not of a very prepossessing appearance. Their stature is rather variable and their bearing has not the stateliness that is often noticed among other Indians. Among the men the face is seldom attractive. The lips are usually thick, the nose is flat and broad, and the coarse black hair worn short (see page 644).

Among the women a few were met

Photo by H. Pittier

EL BOQUETE, SUMMER RESORT OF THE PANAMANIANS, WITH THE CLOUDED CHIRIQUI VOLCANO IN THE BACKGROUND SEE PAGE 633)

with who were positively pretty and—is it necessary to say?—knew it. But beauty is not at a premium among the Guaymi females. A woman ought first to be strong, healthy, and a good beast of burden and day-worker. The children, especially the little girls, also have frequently lovely faces, with a warm brown, velvety skin and beautiful eyes. When they reach the age of puberty their hair is cropped short and not allowed to grow again until the first baby is born. Maidenhood, however, is a short stage of life for the Guaymi women, who not infrequently become mothers before having reached their twelfth year.

Face painting is a common practice, restricted apparently neither by age nor sex, although the women adorn themselves thus only on great occasions. Black, red, and white are the favorite colors, the latter being obtained, as I have been told, by the use of an ordinary oil-paint, which the Guaymies obtain at Bocas del Toro. Little girls keep their faces clean, but boys under twelve were seen with broad black blotches, without definite outline, around their eyes.

In men the decoration is always more elaborate, and certain peculiarities in the patterns, as well as the exact repetition of these by distinct people, lead to the belief that they had formerly and may still have a significance as a totemic or tribal emblem. The groundwork almost always consists of two black lines starting obliquely downward from between the eyes, so as to form on the face a broadly open Λ, the apex of which is on the nose ridge. These black lines are variously supplemented by white or red parallels, terminal appendages, and the coloring in pink, by means of anatto, of the outline of the lips, which then appear much thicker than they naturally are.

In certain communities the wealth of people is estimated by the number of

Photo by H. Pittier

THE CURIOUSLY SHAPED FLOWERS OF *Catasetum scurra*, REDISCOVERED IN PANAMA BY MRS. H. H. ROUSSEAU (SEE PAGE 633)

The yellowish-green perianth is purple striated, with a delicately fringed labellum

Photo by H. Pittier

THE ANCIENT CRATER IS NOW A GRASSY PLAIN SURROUNDED BY DENSELY WOODED HILLS (SEE PAGE 635)

their cattle. Among the Guaymies the number of wives is the standard. The rôle of these in the domestic economy is not, however, merely that of a toy, as among certain Oriental nations. They constitute the working capital of the family, and their way of courting the preference of their master is not through love, but toil. Even thus, and though they are little more than mere beasts of burden, they seem to be quite satisfied with their lot, and it will be a long time before they feel the need of joining in the throng of modern aspirants for sex equality.

The typical Guaymi dwelling is a round house, about eight meters in diameter, with a conical thatch roof. The bare ground constitutes the floor, and the fireplace is either in the middle or at the side. These houses are not always walled. When they are they have no windows, but two doors placed at the opposite ends of a secant to the circumference of the structure. The walls are made of erect sticks brought close together and tied with vines. On the north side plaster made of cow dung and clay is sometimes applied so as to afford a protection against the wind (see page 646).

Benches along the walls are used as beds, although at high altitudes, where the temperature is often very low at night, the resting place is on a light floor just under the roof. Large nets, hanging from the beams, are used in lieu of wardrobes and closets, and the tilling, fishing, and hunting implements, all of a primitive type except the guns, complete the house furnishings. Nowadays the kitchen crockery is mostly imported ware, the only exceptions being the large earthen jars used to keep the *chicha,* or corn-beer, and the calabashes, of universal use in the tropics.

Their dwellings are located either in the midst of the forests of the lower belt, in solitary clearings far apart, or in the high savannas. In the first instance they are always at some distance

Photo by H. Pittier

THE TOP OF THE CHIRIQUI PEAK, THE HIGHEST POINT IN THE REPUBLIC OF PANAMA (11,000 FEET) SEE PAGE 636

from the sea, as the Guaymies, forced back into the mountains by the Spanish invaders, have long since lost the art of navigation.

These forest dwellers are of a quieter and more submissive disposition, though their daily contact with the stealthy and hidden animal life of the woods has made them more cunning and distrustful than their brothers of the savannas. These, living amidst rugged hills, in a relatively cold climate, and enjoying day after day the magnificent panorama of the surrounding mountains and plains, framed in gray clouds and blue waters, are more energetic and open, and also proud of their undisputed independence.

THE CUNA-CUNA OR SAN BLAS INDIANS

According to historical records, confirmed by tradition and by a few local names, the Cuna-Cuna extended formerly as far as the valleys of the eastern reaches of the Chagres River, and covered both sides of the continental divide between the present Canal Zone and the

AMONG THE GUAYMI MEN THE FACE IS SELDOM ATTRACTIVE: THE LIPS ARE THICK, THE NOSE IS FLAT AND BROAD

Photos by H. Pittier

A GUAYMI INDIAN
(SEE PAGES 636, 639, AND 640)

bays of San Miguel and Atrato. In the course of the conquest they offered a steady and stubborn resistance, and, though they have been gradually deprived of a large part of their former territory, it is certain that to this day they never have been really subjugated.

The history of the last four centuries shows not only many instances of their bloody struggle against the hated invader, but also proofs of their ability for political intrigue. During the piratical warfare of the buccaneers, or free-booters, the Cuna-Cuna were their constant allies against the Spaniards, because they well understood that while the latter had come to stay, the former had no idea of securing a permanent foothold in the Isthmus.

When in 1698 Patterson landed on the beach of Caledonia Bay with his small army of settlers, the Cuna-Cuna received him with open arms, readily ceded the required portion of their land, and were to the end the trusted and trusting allies of the luckless Scotchmen.

Photo by H. Pittier

THE LITTLE GUAYMI GIRLS OFTEN HAVE SWEET FACES AND BEAUTIFUL EYES

Today, after 200 years, the natives of the San Blas coast still keep in their heart a warm feeling not only for the latter, but for the British in general. The late Queen Victoria is revered among them almost as a divinity, and even vested by some with the attribute of immortality. Two or three times, indeed, during my short stay among them, I was asked the question: And Queen Victoria—how is she? And my assertion that she had been dead for several years was always received with the utmost incredulity.

Their diplomacy has been shown further in the course of recent events, when the secession of Panama was followed by the advent of the Americans in the Canal Zone, who from the beginning have been looked upon by the Indians as new and formidable conquerors, more dangerous to their race than the Spaniards of old. Such an impression, originating in reports from the Colombian side, could but be confirmed and intensified by the many men of Nárgana, Urgandi, and other places along the coast, who had repeatedly come to this country and stayed in it for longer or shorter intervals, thus becoming eye-witnesses of its might and irresistible power.

So the San Blas people were thoroughly awed, and, as they distrusted the capacity of little Panama to give them the protection they needed, they turned to their former masters, for whom they felt all at once a love and loyalty which years of involuntary and passive submission had not been able to foster.

The venerable chieftain Inanaquina undertook the long voyage to Bogota to

Photo by H. Pittier

GUAYMI HOUSE IN THE FOREST: NEAR BY IS A CLEARING, WHERE PLANTAINS, YAMS, CASSAVA, AND OTHER FOODSTUFFS ARE GROWN (PAGE 642)

put himself and his people under the protection of the Colombian government. He never reached the goal, however. His adviser and interpreter having died of smallpox at Honda, the frightened old man turned in his tracks and succumbed to the same disease in Cartagena.

It was then that a serious blunder was made by the new régime at Panama. The hereditary successor of Inanaquina was his nephew, Inapaquina, and following the news of the former's demise, he was effectively proclaimed as such and acknowledged in most villages. The Panamanian government, however, ignoring the respected tradition, appointed as supreme authority on the whole coast Charlie Robinson, a native of Nárgana, who as a child and young man had spent many years in the United States and fulfilled perhaps better than any other one the desired conditions for the office, but who, in the eye of the Indians, had no right to it.

This resulted in a splitting of the community, the more conservative part of which, from Playon Grande eastward, continued under Inapaquina and the Colombian flag, while the Mandinga Bay natives indifferently accepted the rule of Robinson. Thus inopportune intervention has resulted mainly in the awakening among the majority of the San Blas Indians of a warm feeling in favor of Colombia.

The often circulated reports of the difficulty of penetrating into the territory of the Cuna-Cuna are true only in part. The backwoods aborigines, in the valleys of the Bayano and Chucunaque rivers, have nourished to this day their hatred for all strangers, especially those of Spanish blood. That feeling is not a reasoned one: it is the instinctive distrust of the savage for the unknown or unexplicable, intensified in this particular case by the fear of reprisal for injury or crime committed on several instances,

Photo by E. D. Christopherson

THE CUNA-CUNA OR SAN BLAS INDIANS ARE OF SMALL STATURE: PANAMA

Photo by E. D. Christopherson

SAN BLAS (CUNA-CUNA, OR TULE) INDIANS OF SHIATINAKA

Note the heavy gold disks hanging from the ears of the man on the left (see page 655)

Photo by H. Pittier

SAN BLAS WOMEN AND CHILDREN, PANAMA: EVEN THE SMALL BABY GIRL HAS HER NOSE-RING DECORATION (SEE PAGE 657)

and also by the tradition of a long series of wrongs at the hands of the hated Spaniards.

So they feel that isolation is their best policy, and it would not be safe for anybody to penetrate into their forests without a strong escort and continual watchfulness. Many instances of murders, some confirmed and others only suspected, are on record, and even the natives of the San Blas coast are not a little afraid of their brothers of the mountains.

Of late, however, conditions seem to have bettered, owing to a more frequent intercourse with the surrounding settlements. A negro of La Palma, at the mouth of the Tuyra River, told me of his crossing, some time ago, from the latter place to Chepo, through the Chu-

cunaque and Bayano territories, gathering rubber as he went along with his party. At the headwaters of the Cañaza River he and his companions were held up by the "bravos," who contented themselves with taking away the rubber and part of the equipment, and then let their prisoners go with the warning not to come again.

The narrative of that expedition was supplemented by the reflection of an old man among the hearers that 20 years ago none of the party would have come out alive.

Among the San Blas Indians, who are at a far higher level of civilization, the exclusion of aliens is the result of well-founded political reasons. Their respected traditions are a long record of proud independence; they have maintained the purity of their race and enjoyed freely for hundreds of years every inch of their territory. They feel that the day the negro or the white man acquires a foothold in their midst these privileges will become a thing of the past. This is why, without undue hostility to strangers, they discourage their incursions.

Photo by H. Pittier

SAN BLAS WOMAN IN DAILY ATTIRE

Their means of persuasion are adjusted to the importance of the intruder. They do not hesitate to shoot at any negro of the near-by settlements poaching on their cocoanuts or other products; the trader or any occasional visitor is very seldom allowed to stay ashore at night; the adventurers who try to go prospecting into Indian territory are invariably caught and shipped back to the next Panamanian port.

To the war vessel anchoring close to their coast they send a polite request to leave, and when a high official of the Isthmian Canal Commission asked to buy the sand of Caledonia Bay, to be used in the building of the Gatun locks, he was courteously refused, with the following reply from the old chief: "He who made this sand made it for the Cuna-Cuna who live no longer, for those who are here today, and also for the ones to come. So it is not ours only and we could not sell it."

To judge by the density of the population in the few villages visited by the writer, the San Blas Cunas, who also call themselves Tule, aggregate eight to ten thousand on the stretch of coast between Punta Escribanos and Cape Tiburon. Excepting Bocas del Toro, no other part of the Panamanian littoral is so densely populated, and there is no more orderly community in the whole Republic.

It is a great mistake to consider these Indians as mere savages. At least one man in every ten has traveled extensively as a sailor and has seen more of the world than the average Panamanian.

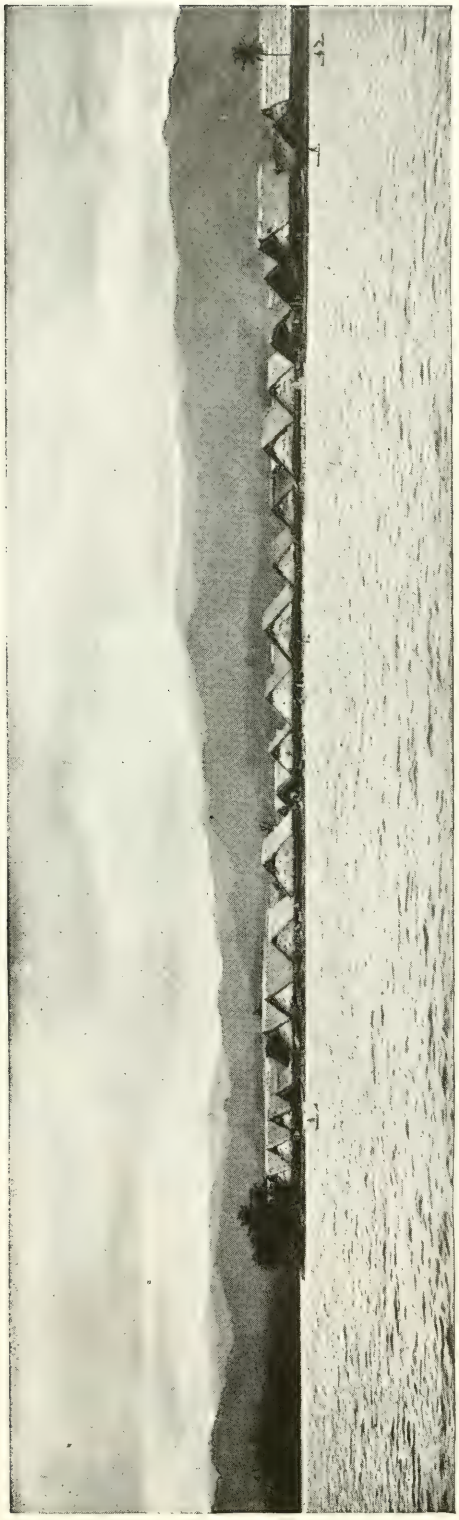


Photo by E. D. Christopherson

THE VILLAGE OF PLAYON GRANDE, ON THE SAN BLAS COAST, 85 MILES EAST OF THE PANAMA CANAL
The houses are about 150 x 50 feet and each shelters 16 to 20 families (see page 657)

Many have come to the United States or to Nova Scotia as children and have gone back grown men, with a relatively high degree of education. English is generally spoken along the coast, even to a larger extent than Spanish. The commodities of San Blas life are an incongruous mixture of native products and imported goods.

Primitive ways are perpetuated by the women, who have not been allowed as yet to have even a glimpse of the outer world and are, although perhaps to a lesser degree than among the Guaymies, the drudges of all work. In justice to them it must be said here that the often-repeated assertion of their hideousness is as wrong as it would be to affirm that all American females are beauties. The remarkable facility with which the San Blas men return to their simple and secluded life after staying for years in a more civilized environment must be attributed largely to feminine influence.

Times, however, are fast changing. Elementary schools, open to little girls, have already been established at Nárgana, under the guidance of a Catholic priest, and it is apparent that woman will soon turn out to be the progressive element of the coast of San Blas, as she is in most communities of Central America.

Besides being excellent sailors and fishermen, the San Blas Indians excel in agricultural pursuits. The whole coast, as well as the numerous islands of Mandinga Bay and farther east, are lined with extensive cocoanut-palm groves, of a variety remarkable for the superior quality and shape of the nuts. Vast areas of the forests are covered with the native ivory-nut palm and the larger growth abounds in balata or bully-trees.

The last three products—cocoanuts, ivory-nuts, and balata—which are sold or bartered either to local merchants or to trading schooners plying between the coast and the United States or New Brunswick and Nova Scotia, are the main

Photo by H. Pittier

PHYSICALLY THE CHOCOES OF PANAMA ARE A FINE LOOKING AND HEALTHY RACE: CHIEF DON CARLOS AND HIS SON (SEE PAGES 657-659)

Photo by H. Pittier

CHIEF DON CARLOS' LADY, WHO, NOTWITHSTANDING HER AGE, HAS PRESERVED HER GOOD LOOKS

sources of wealth of these natives, among whom money is never scarce and poverty an unknown thing. The staple crops for local consumption are raised in small clearings scattered through the forests of the interior and reached by water from the coast; besides most of the usual fruits of tropical America, these include plantains, corn, rice, cassava, yams, and some cacao.

The land belongs undivided to the community, so that any encroachment is considered as a public damage. Annual crops are seldom produced several years in succession on the same piece of ground, but once this is cleared and tilled it belongs to the individual or family who have done the work, until it returns to the public domain through voluntary abandonment.

Any cacao, orange, or other fruit-tree planted by hand becomes an hereditary possession, transmitted through the female line. I was unable to ascertain the traditional laws regulating the ownership of the cocoanut-palm plantations, but was led to understand that it is the same that obtains for any kind of fruit-tree as well as for plantain groves.

They do not seem to have any religious system, but there are indications of their holding to the notion of a superior being, the author of all things and the embodiment of goodness, and also of a bad spirit, governing all evil, whom they fear and revere more than the former. Their *lele,* or sorcerers, are at the same time the medicine men and the representatives of that genius of evil—a sensible combination—since they are supposed to have the power to check the harm caused by the latter.

At the time of the blossoming of the fruit-trees, and when the yearly seeds

Photo by H. Pittier

THE CHOCO GIRLS ARE FAT AND FULL OF MISCHIEF: THE PAINTING OF THE BODY IS ABOUT AS EFFECTIVE AS A PEEK-A-BOO WAIST: PANAMA

This picture represents one of Don Carlos' daughters, who is very fond of finger-rings

Photo by H. Pittier

CHOCO INDIAN WOMEN OF THE SAMBU VALLEY IN THEIR SIMPLE, EVERY-DAY DRESSES: PANAMA

Note the peculiarity in the toes. With their feet they can pick up the smallest objects from the ground

are trusted to the earth, invocations in the form of recitals are sung by the men, and possibly offerings made, to propitiate the evil genius and call the blessing of the kindly God. I succeeded in obtaining a part of the invocation referring to the cacao crop. It seems to consist of an enumeration made to the *lele* of the several varieties of the cacao-pods, and of an appeal to a being personified by the ever-traveling sun.

The San Blas Indians are of small stature, with the body unusually long and broad-chested and the limbs short. The head is round and large and cheek bones very high, the nose long and often aquiline. The skin is dark reddish brown in the men, a few shades lighter in women. The hair is jet-black and as a rule cropped short, though a few of the girls wear it rather long, and the men have sometimes the whole mass of it cut straight, or bobbed, at the neck. Most women have remarkably fine white teeth.

Polygamy is allowed, but seldom practiced nowadays.

As a result of their frequent intercourse with the outside world, the San Blas men have adopted the ordinary garb of civilized people, reducing it to the simplicity required by the warm climate. Their native hats are peculiar in having the form much smaller than the head of the wearer, so that they are kept in place only by the stiff, short hairs acting as a sort of clinching spring.

Many men wear hanging from their ears large gold disks, often of the size and thickness of a $20 gold-piece. They are reticent as to the origin of the metal. In old times they probably obtained it by washing the sand of the rivers, several of which are said to be auriferous, but at present they very likely use for their personal adornment American and English treasure, having it modified to suit their taste by the native gold and silversmiths established in almost every village (see page 647).

The custom of face-painting is rapidly disappearing. At one of the villages some boys were seen wearing a single blue line along the ridge of their noses, and the *lele,* or medicine man, of Shiatinaka had evidently rouge (anatto dye) on his cheeks. These were the only instances of this kind of ornamentation, formerly of much more general vogue. The Chucunaque and Bayano Indians, who, their scant clouts excepted, dispense with clothes, are reported to paint their whole body jet black before starting on their hunting or fishing expeditions.

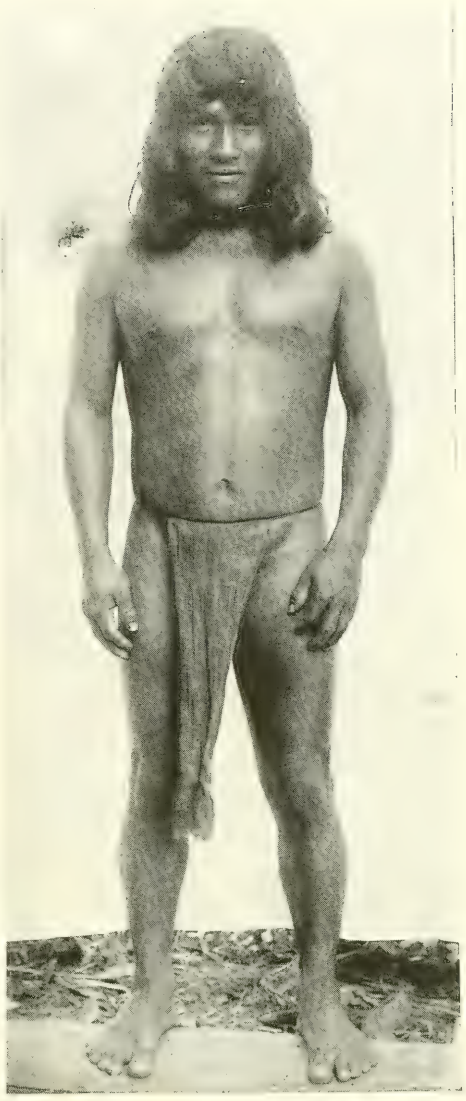


Photo by H. Pittier

A CHOCO INDIAN MAN OF THE SAMBU VALLEY IN EVERY-DAY DRESS

Photos by H. Pittier

A CHOCO INDIAN OF THE SAMBU VALLEY: REPUBLIC OF PANAMA
His hair is tied with a pearl-embroidered band. Note necklace of coins

For every-day wear, the apparel of the Cuna women consists of a short skirt, red or blue, extending from the hips to the knees. The upper part of the body is covered with a kind of loose blouse, the sleeves of which do not reach the elbow. Over these two garments there comes a second skirt, reaching from the waist to the ankles.

Of course, with reference to skirts, it must be understood that the word is used only for convenience sake, not meaning the rather complicated piece of civilized woman's raiment, but a single seamless piece of calico, not over four yards long, and rolled around the body.

The necks of the women are loaded with necklaces made of red, white, or blue beads, to which are added old Colombian silver coins. They also wear, occasionally, in their ears gold rings or disks, these latter like those of the men, and in their noses always another ring of the same metal, which is seen even on suckling baby girls, and is never removed at death (see page 648).

At Armila an opportunity offered itself to study the gala wearing apparel of the chieftain's wife, who was evidently the village belle. She had on some sort of short "sheath skirt" of white materials, and a long coat made of the appliqué work which is a peculiar product of the Cuna-Cuna handicraft. Her head was covered with a bright bandana handkerchief.

Besides her ear-disk and nose-ring, she wore on each arm a broad cuff at the wrist and a narrower band at the elbow; her legs were incased each in three tight bands, bound together by three vertical strings. Through the broad intervals the muscles were bulging abnormally, showing that the bands had been placed long ago and never removed. All these latter ornaments were made of white beads sown closely together on a piece of strong canvas.

There seems to be much variation as to the size of the Cuna houses, but they all have the naked beaten ground as floor and a high gable roof.

The two islands at Nárgana are literally covered with large dwellings, about 150 feet long by 50 feet broad, the long ridge of the palm-covered roof being 30 to 40 feet from the ground (see photo, page 650). Directly under this ridge there is a large alley, running between two ranges of high pillars, which support the middle part of the structure. On each side other upright posts divide the space into square compartments, each of which is occupied apparently by a separate family. There are only two low doors at each end of the building, and the side walls are made of sticks tied together, as are all parts of the building, with mountain vines.

These houses are packed so close together that there is no space left between them. Each shelters from 16 to 20 families, the exact parental relations of which would be an interesting demographic study.

THE CHOCOES

"Les peuples heureux n'ont pas d'histoire!" While the history of the Cuna-Cuna could be written, at least for the post-Columbian period, by putting together the brief accounts of the Spanish chroniclers, the quaint narratives of old writers like Wafer and Dampier, and oral tradition still current among the people of the tribe, we know almost nothing of the Chocoes They are seldom referred to in ancient records, and in modern times they have been visited by only one or two travelers, who have gathered but scant information. Our own visit among them was a short one, limited to the lower and middle part of the Sambu Valley, in the Panamanian section of southern Darien.

Never in our 25 years of tropical experience have we met with such a sun-loving, bright and trusting people, living nearest to nature and ignoring the most elementary wiles of so-called civilization. They are several hundred in number and their dwellings are scattered along the meandrous Sambu and its main reaches, always at short distance, but never near enough to each other to form real villages. Like their houses, their small plantations are close to the river, but mostly far enough to escape the eye of the casual passer-by.

Photos by H. Pittier

A CHOCO INDIAN OF THE SAMBU VALLEY, REPUBLIC OF PANAMA: HIS HEAD IS ADORNED WITH BRIGHT FLOWERS OF THE FOREST: NOTE THE BROAD SILVER CUFFS

Dugouts drawn up on the beach and a narrow trail breaking the reed wall at the edge of the bank are the only visible signs of human presence, except at the morning hours and near sunset, when a crowd of women and children will be seen playing in the water, and the men, armed with their bows and long harpooned arrows, scrutinizing the deeper places for fish or looking for iguanas and crabs hidden in the holes of the banks.

Physically the Chocoes are a fine and healthy race. They are tall, as compared with the Cuna-Cuna, well proportioned, and with a graceful bearing. The men have wiry limbs and faces that are at once kind and energetic, while as a rule the girls are plump, fat, and full of mischief. The grown women preserve their good looks and attractiveness much longer than is generally the case in primitive peoples, in which their sex bears the heaviest share of every day's work (see photos, pp. 652, 653).

Both males and females have unusually fine white teeth, which they sometimes dye black by chewing the shoots of one of the numerous wild peppers (*Piper* sp.) growing in the forests. The skin is of a rich olive-brown color and, as usual, a little lighter in women and children. Though all go almost naked, they look fairer than the San Blas Cunas, and some of the women would compare advantageously in this respect with certain Mediterranean types of the white race.

The hair is left by all to grow to its natural length, except in a few cases, in which the men have it cropped at the neck. It is coarse and not jet black, as reported of most Indians, but with a reddish hue, which is better noticed when the sun is playing through the thick mass.

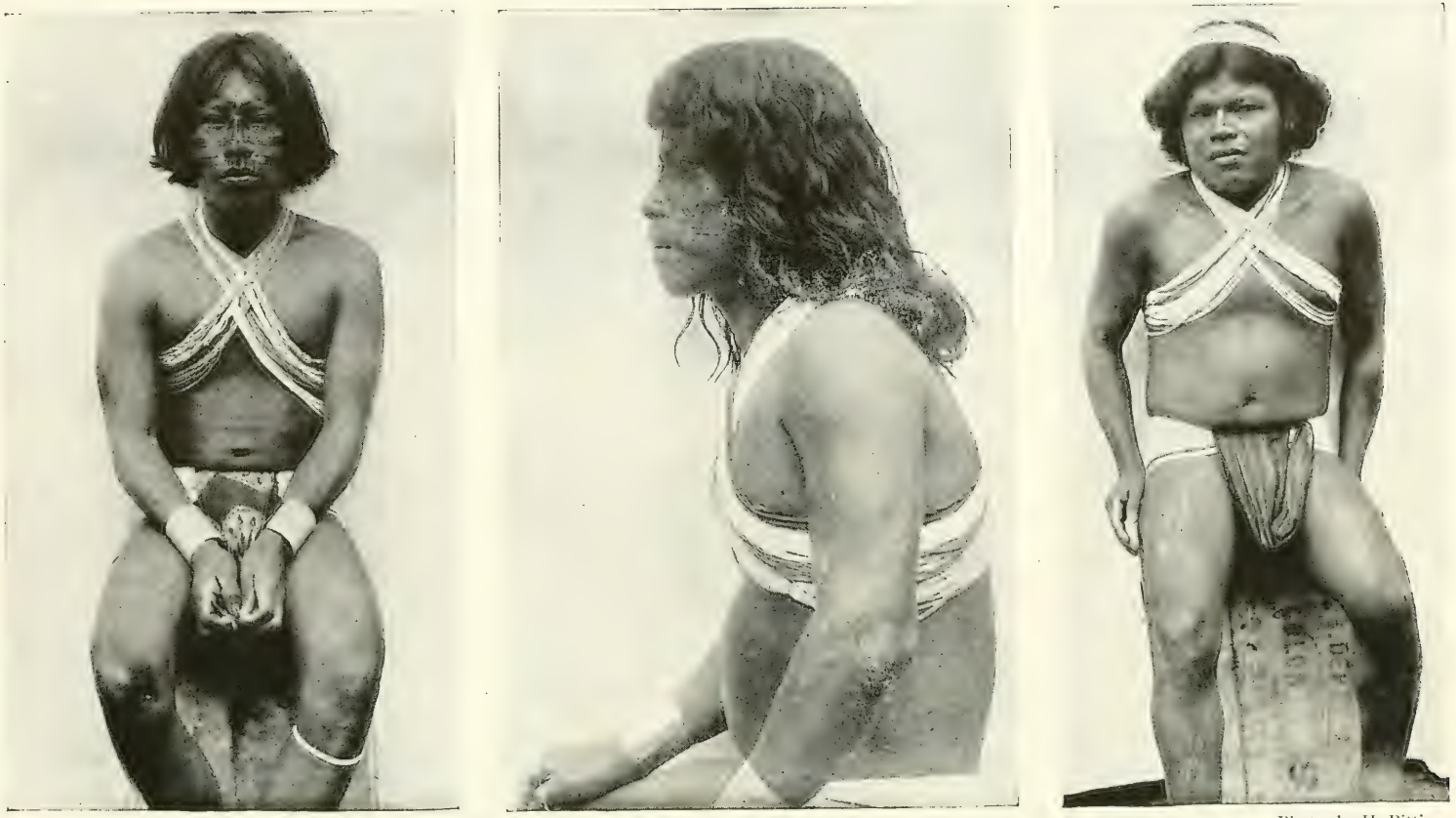
In young children it decidedly turns at times to a blond color, the only difference from the Caucasian hair being the pronounced coarseness of the former. As there are no white people living within a radius of 50 miles, but only negroes, mulattoes, and zambos, this peculiarity cannot be explained by miscegenation and may therefore be considered as a racial feature of the Choco tribe.

In men the every-day dress consists of a scanty clout, made of a strip of red calico about one foot broad and five feet long. This clout is passed in front and back of the body over a string tied around the hips, the forward extremity being left longer and flowing like an apron. On feast days the string is replaced by a broad band of white beads. Around the neck and chest they wear thick cords of the same beads and on their wrists broad silver cuffs (see photo, page 658). Hats are not used; the hair is usually tied with a red ribbon and often adorned with the bright flowers of the forest.

The female outfit is not less simple, consisting of a piece of calico less than three feet wide and about nine feet long, wrapped around the lower part of the body and reaching a little below the knees. This is all, except that the neck is more or less loaded with beads or silver coins. But for this the women display less coquetry than the men, which may be because they feel sufficiently adorned with their mere natural charms. Fondness for cheap rings is, however, common to both sexes, and little children often wear earrings or pendants.

The scantiness of the clothing is remedied very effectually by face and body painting, in which black and red colors are used, the first exclusively for daily wear. At times men and women are painted black from the waist down; at other times it is the whole body or only the hands and feet, etc., all according to the day's fashion, as was explained by one of our guides. For feast days the paintings are an elaborate and artistic affair, consisting of elegantly drawn lines and patterns—red and black or simply black—which clothe the body as effectively as any costly dress.

From the above one might conclude that cleanliness and modesty are not the rule among the Chocoes. As a matter of fact, the first thing they do in the morning is to jump into the near-by river, and these ablutions are repeated several times in the course of the day.



Photos by H. Pittier

CHOCO INDIANS OF THE SAMBU VALLEY: REPUBLIC OF PANAMA

The fellow at the left has horizontal lines across the face, a pair of silver cuffs, and a string of beads on his left leg; the one at the right is unusually plump and fat. Note face-painting

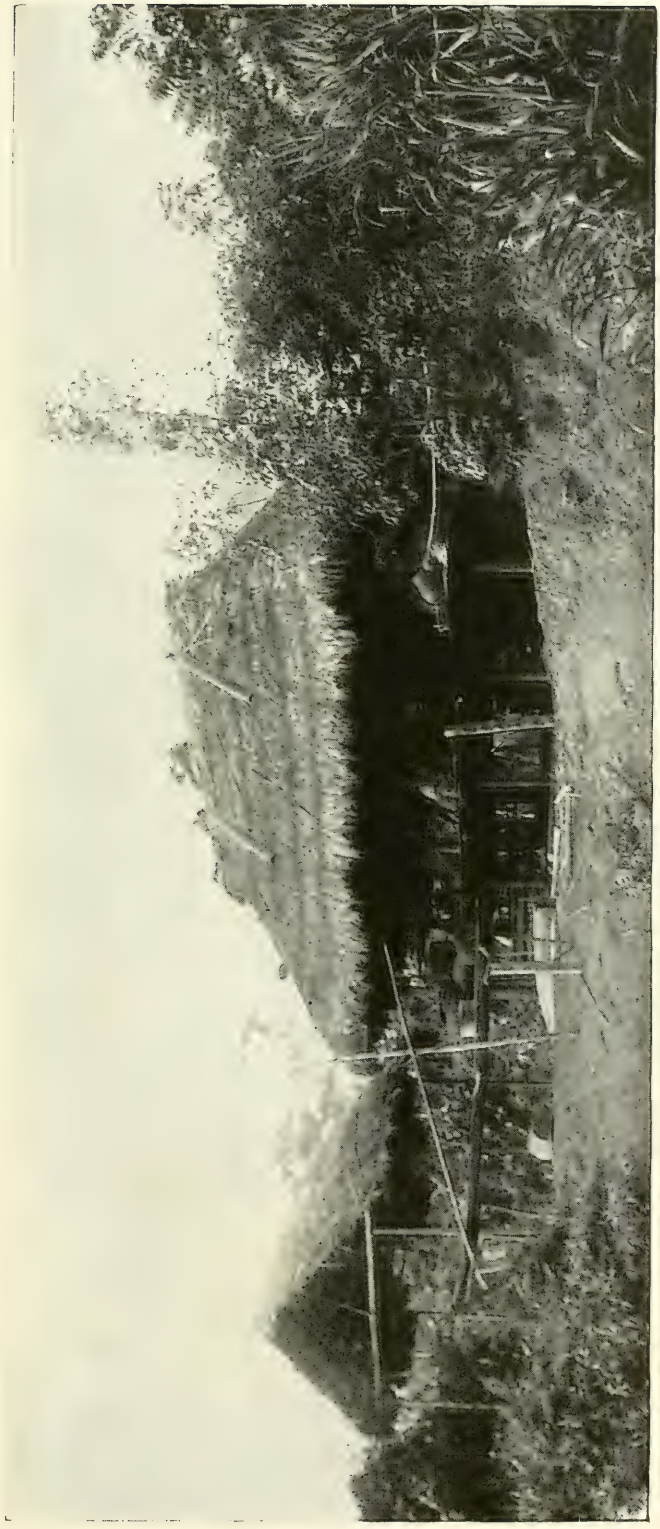


Photo by H. Pittier

THE HOUSES OF THE CHOCOES ARE BUILT HIGH UP ON THE RIVER BANK AND ARE SELDOM VISIBLE TO THE PASSING CANOES

The kitchen utensils are always thoroughly washed before using, and, contrary to our former experience, their simple dishes, prepared mostly in our presence, looked almost always inviting. During our stay among these good people nothing was noticed that would hurt the most delicate sense of decency.

The Chocoes seem to be exclusively monogamist and both parents surround their babies with tender care, being mindful, however, to prepare them early for the hard and struggling life ahead of them. Small bows and arrows, dexterously handled by tiny hands, are the favorite toys of the boys, while the girls spend more time in the water playing with miniature dugouts, washing, and swimming. The only dolls seen among them were imported ones, and they seemed to be as much in favor among grown women as among children. These latter go naked until they are about 5 years old, when the girls receive a large handkerchief to be used as a "paruma," or skirt, and the boys a strip of some old maternal dress for a "antia," or clout.

The houses of the Chocoes are built on a better plan, as far as hygiene and comfort are concerned, than those of either the Cuna-Cuna or the Guaymies. Placed high up on the river bank and seldom visible to the passing canoes, their structure is almost

uniform, although the dimensions vary. That of one of the leading men of the Sambu Valley is rectangular and measures about 50 by 30 feet, the longest side facing the river.

The floor is raised eight feet from the ground and supported on each long side by a row of four palm posts, which extend through it and bear the weight of the roof. Trunks of the Iriartea palm, split open and flattened, form the flooring. The roof is palm-thatched and with four sheds, two of which correspond to the long sides of the houses and join at the top in a gable 12 feet long, while the two remaining ones at the ends of the building are triangular. There are no walls (see page 661).

Access to the floor is by means of a notched pole, which is turned over when the dogs are not wanted around, or also to indicate the absence of the family. The kitchen hearth is built at the corner least exposed to the prevailing wind, and consists of a square frame filled with clay, with a few loose stones on which to set the pots. Such a house has an ideal ventilation and affords at the same time a good shelter against rain and the excessive dampness of the soil.

At night the floor, which is kept scrupulously clean, is turned into a family bed. Long sticks are inserted between the slats and made to reach the ground below, and on these mosquito bars are hung. Bark mats form the bedding. The largest space is the parental nook, occupied also by the babies, while the elder girls and boys each have their own sleeping corner.

The Chocoes are very industrious. During the dry spells their life, of course, is an out-of-door one, planting and watching their crops, hunting, fishing, and canoeing. But when the heavy rains come they stay at home, weaving baskets of all kinds—a work in which the women are proficient—making ropes and hammocks, carving dishes, mortars, stools, and other objects out of tree trunks.

And right behind the house is the great forest, never yet violated by the civilized man's ax. There the giant monkey-pot tree raises its crown 150 feet above the ground, extending its protecting branches over many other portly trees unknown today, but which may sooner or later find their way to the mills and shops of civilized nations. Under their shadowy tops high palms with elegant stems, ariza-trees whose trunks are hidden under hundreds of scarlet flowers, vines whose enlacing stems extend from branch to branch, and epiphytic plants that fill every available nook, all compete in luxuriance and beauty.

THE FIGHT AGAINST FOREST FIRES

By Henry S. Graves
Chief of U. S. Forest Service

THE first step necessary in establishing the practice of forestry is the prevention of forest fires. Until recently there was no organized effort in the United States to prevent forest fires. In many sections they were regarded as a matter of course, and almost no consideration was given to their consequences.

Forest fires are by no means confined to recent periods, although the greatest damage has taken place since the development of the country began. There are relatively few forest regions of the country where some traces of forest fires cannot be found. Scars at the base of trees, the presence of charred wood, peculiarities in the character, composition, and form of the forest indicate to the forester that there has been fire of greater or less severity.

It is probable that nearly the entire forest area of the country has been burned over by fire at some time or other, although in many places the fires may have merely burned over the ground

A FOREST FIRE SWEEPING UP A SLOPE IN THE ROCKY MOUNTAINS

without serious damage to the largest trees.

The ancient fires were started by lightning and by Indians. Traces of injuries to the big trees in California are found dating back over 1,000 years.

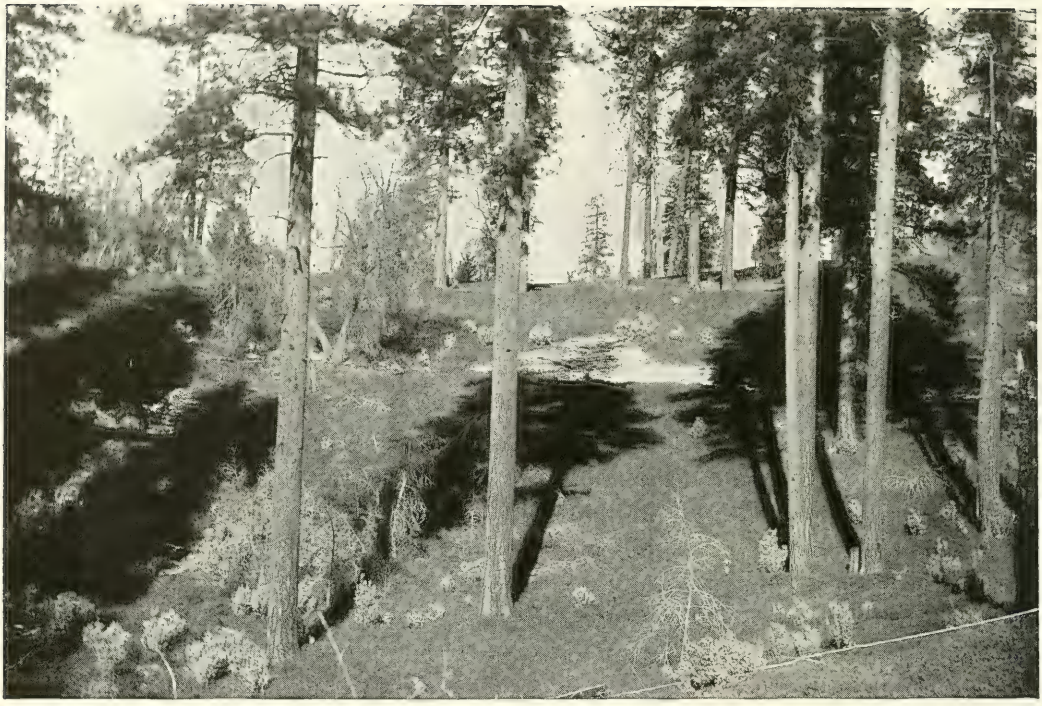
It is a common belief that the virgin forest represents the maximum product of the soil. This is because there are present many large and old trees. Most virgin forests, however, in this country have been thinned by repeated fires, and the present product does not by any means represent what might be standing on the ground if there had not been any such injury.

Many illustrations of this are found in the mountains of the West, where past fires have left the forests open and broken and with a greatly depleted yield of timber (see photo, page 664). As soon as these forests were put under protection by the national government an immense amount of young growth began to spring up in the open stands, indicating possibilities for production of timber entirely beyond anything represented by the virgin stands.

With the opening up of the forest regions by settlement, railroad construction, lumbering, and other development, forest fires began to increase at an enormous rate. Lumbering was almost invariably followed by fire, and many of the most disastrous conflagrations have resulted from fires which gained their first headway in the dry tops left after logging.

In every forest there is a certain amount of inflammable material, consisting of dry leaves, decayed vegetable mold, branches, twigs, cones, dry grass, and other litter. The most common type of fire is that which runs over the surface of the ground, consuming this material. This is called a surface fire. Sometimes a fire may start when only the upper layer of leaves is dry, and may run slowly through the woods without serious injury. More commonly they occur in very dry weather and burn all the ground cover, destroying all small trees and either killing or injuring the larger trees.

Repeated fires of this character rapidly reduce the density of a forest, for some



THE EFFECT OF FOREST FIRES IN MAKING A FOREST OPEN AND BROKEN

A forest of yellow pine in California. Every fire kills some trees, and, if continued, finally destroys the forest. This forest has been opened up and has only a relatively small yield of timber as a direct result of past repeated fires.

trees die as the result of each fire, and, as the young growth is also killed, the forest becomes more and more open and broken. This explains why in many remote forests, where there has never been any cutting at all, the trees stand far apart and the yield in valuable material is small. Frequently in a virgin forest the yield is not over one-fifth to one-tenth of what it would have been if fires had not occurred.

In some regions, particularly in the North, there is in the forest a deep layer of decayed vegetable mold, or humus, frequently one to three feet deep. When this becomes thoroughly dry a fire burns slowly and persistently through it, killing the roots of the trees. These are called ground fires and are exceedingly difficult to extinguish. They have been known to smoulder for long periods under the snow (see photo, page 667).

The most destructive fires are those which not only burn over the ground, but sweep up into the tops and actually consume the crowns of the trees. These are called crown fires. They are common in forests composed of coniferous trees, as the forests of the East and the Lake States and the coniferous forests of the far West. The crown fire usually starts as a surface fire; but, under the influence of a strong wind or when burning in a mass of old, dry tops or other débris, the flames are carried into the crowns. With conditions just right the green crowns are ignited, and a conflagration develops which sweeps everything before it.

TERRIFIC FIRES WHICH KILLED HUNDREDS OF PEOPLE

There have been a number of great fires which have attained historic importance. One of these occurred in New Brunswick, in the fall of 1825, on the Miramichi River, during a season of great drought. Many fires of greater or

A TYPICAL VIRGIN FOREST IN WASHINGTON UNTOUCHED BY FIRE

The principal tree is Douglas fir, three to eight feet in diameter and 200 to 250 feet high. Forest fires have done but little serious damage. Trees of all ages grow mingled together.

less proportions were burning throughout that region, and it is probable that but little effort was made to extinguish them. Early in the afternoon of October 7 the various smaller fires began to sweep together and formed a single fire of enormous proportions.

Within nine hours the fire had burned over a strip of forest 80 miles long and 25 miles wide, destroying every living thing in its path. One hundred and sixty persons perished and nearly 1,000 head of stock. Five hundred and ninety buildings were burned and a number of towns were destroyed, including Newcastle, Chatham, and Douglastown. It is

SLASH LEFT AFTER LOGGING: THE GREATEST MENACE FROM FIRE
In all timber sales on the national forests this débris is destroyed

related that even great quantities of fish in the river were killed by the heat of the fire.

Another historic fire was that which occurred in Wisconsin in the fall of 1871. A single fire swept over an area of more than 2,000 square miles. It destroyed the town of Peshtigo, and between 1,200 and 1,500 persons perished. That same year the damage by fire elsewhere in the country was enormous.

Still another fire, which is still remembered by many persons, was that which destroyed the town of Hinckley, Minnesota, in the fall of 1894. As in other cases of great fires, there was a season of exceptional drought. The woods became very dry, especially on those areas which had been recently cut over by the lumbermen, where a great mass of tops and other débris was left upon the ground. Many fires were constantly starting during that fall, but there was no effective effort to extinguish them. Forest fires were so common that there was no special fear of possible danger until it was too late to meet the situation.

As often happens when there are many fires burning under these conditions and a high wind springs up, the different small fires were suddenly merged together, and a great crown fire resulted which swept over the town of Hinckley and six other towns, entirely destroying them, killing 500 persons, and making over 2,000 more entirely destitute. The estimated loss in property by this fire was more than $25,000,000.

THE GREAT CATASTROPHE OF 1910

The most recent great disaster from forest fires occurred in the Pacific Northwest in 1910. That year was the driest ever known in the West, particularly in northern Idaho and northwestern Montana. Practically no rain fell from early spring until October. The

AFTER A FOREST FIRE IN WISCONSIN

This forest of larch was destroyed by a ground fire burning in the deep vegetable mould. The roots were killed and the trees uprooted by the wind

forest became dry as tinder and there were fires springing up here and there throughout the forests. Many fires were started as early as May and by the middle of June the situation became serious.

The national forests in this section are in many cases still without roads, trails, and other means of communication, so that although the forests were equipped with a force of patrolmen many fires started at remote points which it was impossible to reach until the fires had gained considerable proportions and were very difficult to extinguish.

On July 23 a severe electric storm, practically without rain, passed over the northern Rocky Mountains, setting a large number of fires. The Cœur d'Alene Mountains in particular suffered from these fires. In three days the forest rangers put out nine fires set by lightning in the Cœur d'Alene National Forest.

Five others from the same cause and same storm started in remote and inaccessible places which could not be reached until they assumed large proportions. From one cause or another, many other fires were set. Heroic measures were taken to extinguish them.

At one time 1,800 men, besides two companies of soldiers, were fighting fires in the Cœur d'Alene forest alone, and large crews were fighting fires in other parts of the northwestern forests. The men fought stubbornly, working day and night building trenches around the fires and gradually confining them to a small area.

All fires seemed to be under control, when on August 20 a terrific hurricane sprung up, sweeping all the separate fires together and making a gigantic wall of flame many miles long. Many of the fire fighters were directly in the path of the fire. Seventy-nine fire fighters were killed, and if it had not been for the skill and the nerve of the forest rangers in charge of the crews a very much larger number would have perished. As it was, about half of the number killed lost their lives because of their failure to obey the

A FOREST OF NOBLE FIR IN WASHINGTON DESTROYED BY FIRE
This forest contained 20 to 40 thousand feet per acre of valuable timber

orders of the forest rangers in charge of the parties.

HEROISM OF FOREST RANGER PULASKI

Many instances of heroism occurred during that fire whose recounting would fill many pages. One case will serve as a typical illustration of the sterling qualities of the men making up the force of rangers protecting our national forest property.

Forest Ranger Pulaski was in charge of about 150 men, distributed over a distance of several miles along the divide between Big Creek of the Cœur d'Alene River and Big Creek of the St. Joe River. As the peril became imminent he brought together about 40 of his men who were in the danger zone and started with them down the mountain toward Wallace, Idaho, a distance of 10 miles. When about half way down the mountain he found that he was cut off by new fires.

His men became panic-stricken, but he assured them that he would still get them to a place of safety. Being thoroughly familiar with the region, he knew of two prospect tunnels near by, the shorter being about 50 feet and the longer about 100 feet in length. Not being certain whether he could reach the largest and safest, he put a wet gunny sack over his head and worked his way to the largest tunnel. Finding that it was safe, he rushed back to his men and hurried them to the tunnel, arriving just in time to get them inside before the fire reached them. At this time he had with him 42 men, all of whom he managed to get into the tunnel with the exception of one, who had fallen behind and was caught by the fire before he could catch up with his comrades.

The timbers supporting the tunnel caught fire, and Pulaski, standing guard at the mouth of the tunnel, managed to catch with his hat some water from a little stream that flowed from the bottom of the tunnel, which he kept dashing upon the burning timbers until he himself was so badly burned that he fell unconscious. Prior to losing consciousness he commanded his men to lie on their faces for protection.

Probably all of the men were uncon-

A TYPICAL SCENE OF DESOLATION AS THE RESULT OF FOREST FIRES: MINNESOTA

scious for a time, but finally one who had received less injuries than the others was able to crawl out of the tunnel after the fire had passed over them and drag himself into the town of Wallace to notify the forest office of the situation. This was about 3 o'clock in the morning.

A crew was immediately organized and sent to the tunnel. All of the men were saved with the exception of five, who had been smothered before relief came. Had not Pulaski known of the location of the tunnel and handled the situation with the skill and courage that he did, his entire crew would have perished.

ONE HUNDRED MILLION DOLLARS DESTROYED EVERY YEAR BY FOREST FIRES

During the same year there were many fires throughout other parts of the West, including California, Oregon, and Washington. These occurred both on private lands and on the public forests.

On the national forests alone there were over 5,000 fires. Most of these were extinguished by the organized force of rangers, the chief damage being done by a few fires which could not be controlled on account of lack of trails, telephone lines, and other improvements. The damage to the public forests alone amounted to over 14 million dollars in the destruction of timber, besides extensive damage to young growth.

If there had been no organized force of men to fight the fires, practically the entire forests in many regions would have been destroyed. It is certain that the damage would have reached 100 million dollars and perhaps twice that amount.

But the great loss by forest fires is not by any means confined to these great conflagrations. The scattered smaller fires destroy also a large amount of merchantable timber, but the very greatest damage, often overlooked, is in the killing of the immature and small trees and the prevention of new growth.

The indirect injury by forest fires is also enormous. The fire risk removes incentive to the practice of forestry by private owners. The rapid destruction of the forest by fires results in the short life of many industries, a reduction in land values, and after a time the actual depopulation of forest regions. Still another serious result of forest fires in

VAST DESTRUCTION BY FOREST FIRES: SAN FRANCISCO MOUNTAINS, ARIZONA

A FOREST AT THE FOOT OF MOUNT SHASTA, CALIFORNIA: THIS CONDITION IS THE RESULT OF REPEATED FIRES

mountain regions is the disturbance of the regularity of water flow and the erosion which under certain conditions causes great damage.

The total annual damage from forest fires, including the destruction of timber and other property, the destruction of young growth, the prevention of young growth, and all the indirect injurious effects, is difficult to estimate. It has been generally accepted that the damage to timber alone has amounted to at least 25 million dollars annually. The annual destruction of immature trees and young growth probably totals fully 20 million dollars, while the injury resulting from the actual prevention of reproduction is at least 60 million dollars more. This must be considered in connection with the drain on our forests for products actually used in the form of timber, poles, ties, mine props, fuel, etc.

It means but little to the layman to say that we use each year over 40 billion feet of lumber, or 23 billion cubic feet of all classes of wood, including fuel. Suffice it to say, that it requires 8 to 10 million acres of well-stocked forest, such as occurs in the East, to provide one year's supply.

FOREST FIRES CAN BE PREVENTED

When the reader realizes that the production of timber by growth is only about one-third the amount used (and in this statement no account is taken of the vast destruction by forest fires), he will appreciate how imperative it is that we stop the fires and also that we introduce forestry methods, in order that we may produce new supplies to meet the needs when the virgin stock is exhausted.

The old view, that forest fires are inevitable and that no system can be devised to prevent them, is obsolete. It has been clearly demonstrated within the last few years that by proper organization forest fires can be prevented. But if the forests are neglected forest fires cannot be prevented, any more than city fires can be prevented without an efficient and well-equipped fire department.

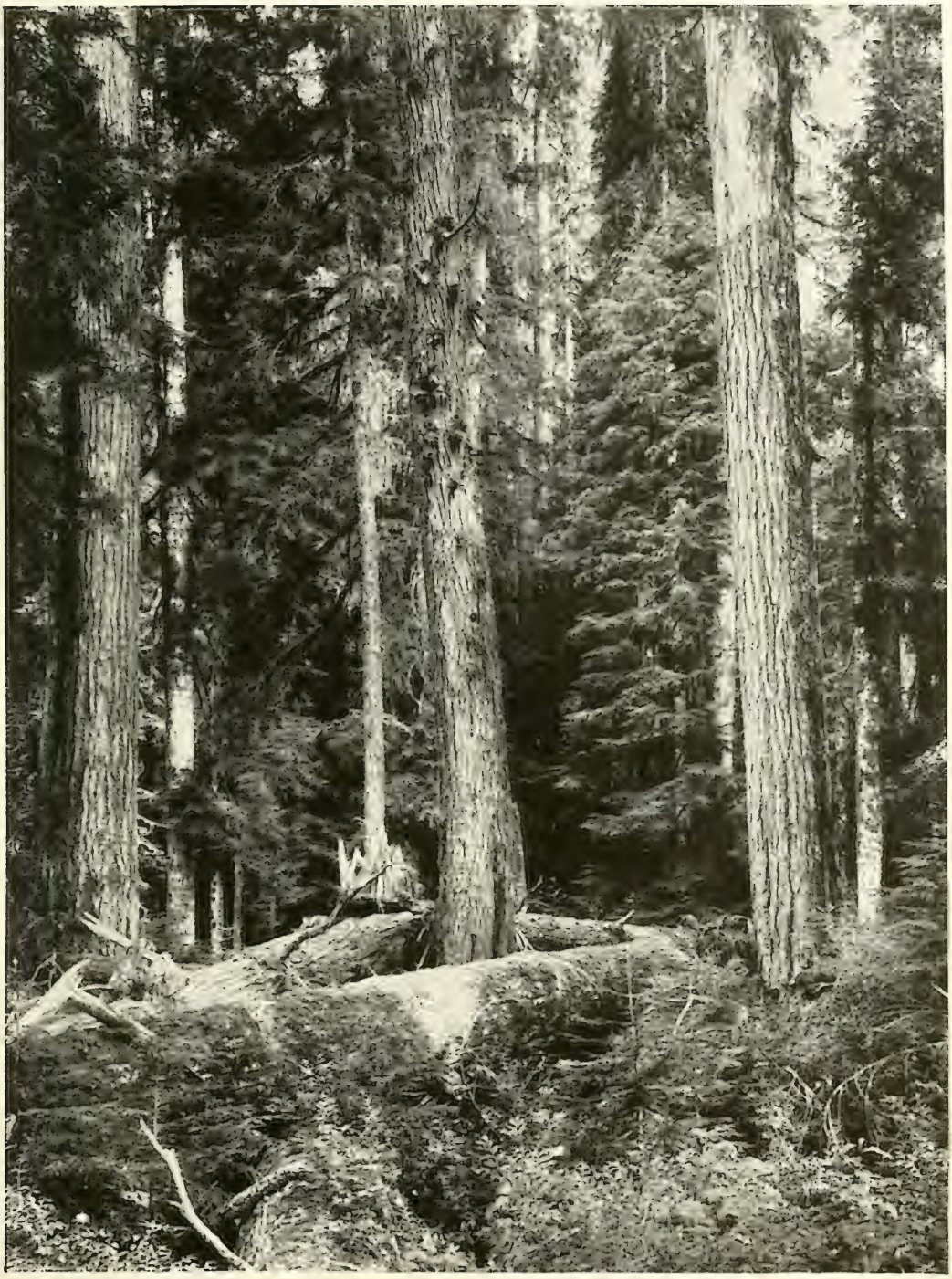
We have had great losses by forest fires because adequate steps have not

FALLEN DEAD TREES IN A LODGE-POLE FOREST IN MONTANA

This dead material makes dangerous fuel for fires, renders travel slow, and fire-fighting very difficult

been taken to prevent them. In many cases the laws are entirely inadequate. The chief trouble has been the unwillingness to spend the money necessary to do the work. There should be much more liberal appropriations for the protection of public forests and for promoting forestry among private owners, and private owners should take better care of their timbered and cut-over land.

It is simply a question of reasonable insurance against great financial loss. Thus the national forests represent a value of over two billion dollars at the most conservative estimate. The annual gross expenses of administration, protec-



FALLEN TIMBER IN A WASHINGTON FOREST

Many virgin forests in the Northwest have an immense amount of down timber, making fire protection extremely difficult

WALLACE, IDAHO, AFTER THE FOREST FIRE OF 1910: ABOUT 200 BUILDINGS WERE DESTROYED

tion, permanent improvements, and all other work upon them amounts to only about two and one-half cents per acre, or about two and one-half mills on each dollar of valuation. The net cost, after deducting receipts, cuts this in two, and in a few years there will be no drain on the government at all, as the receipts will more than balance the expenses.

In this connection it may be added that Prussia spends about $2.50 per acre annually on its public forests, and France about $1 an acre. Even British India spends over twice as much per acre on its public forests as the United States.

PROTECTING OUR NATIONAL FORESTS

The protection of the vast domain of our public forests has been a gigantic task, inasmuch as the national forests are located chiefly in the mountain regions of the West, and, including the forests in Alaska, comprise a gross area of about 190 million acres.

These forests are still, for the most part, in a state of undeveloped wilderness. When first organized there were in the forests almost no means of transportation and communication; thousands of square miles were almost inaccessible for patrol or for transportation of men and supplies in case of fire. The forests themselves are chiefly composed of coniferous species, a type of forest far more exposed to serious fires than those composed of hardwoods. In many sections there is a prolonged dry season in the summer, during which the fire danger is critical.

The first step taken was to organize a force of men, properly distributed, to patrol the forests and to fight such fires as occurred. Accordingly the forests were divided and subdivided into such divisions and districts as were necessary for effective organization. The effort was at once made to remove as fast as possible the causes of fires, because the aim of organized protection is to prevent fires from starting at all. This condition is, however, a long way off, and in the meantime preparation must be made to reach quickly fires which may occur, and with the necessary means to extinguish them.

The causes of fires may be well illustrated by the record of those occurring on the national forests in the year 1911, as follows: Railroads, 33 per cent; lightning, 14 per cent; incendiary, 6 per cent; brush-burning, 6 per cent; campers, 13 per cent; saw-mills and donkey engines, 1 per cent; miscellaneous, 5 per cent; unknown, 22 per cent. These are all preventable causes, except lightning.

The principal danger from lightning lies in the fact that there are throughout the forests standing dead trees and old snags which are dried out and easily ignited when struck. Ultimately, when the forests are fully opened up and developed and these old snags are removed, the principal danger from lightning fires will have been removed.

Railroad fires will be eliminated when it is a requirement for locomotives to burn oil or carry adequate spark arresters. Pending the time when this can be accomplished, the forest service is requiring the clearing of rights of way of inflammable material and careful patrol of the tracks in coöperation with railroads. The number of railroad fires were reduced within the last year by five per cent.

Most fires from other causes are due to carelessness. Education of the people to exercise care in the use of fires on the forests and strict enforcement of laws and regulations is gradually bringing about a change in this respect. Time is required to bring about this reform, although great advances are being made every year. Meanwhile, as it is inevitable that fires will start here and there in the public forests, the government must be in position to stop them before there has been time for them to develop into conflagrations which cause serious damage.

It is recognized that effective fire prevention is impossible until the forests are opened up with means of transportation and communication and are otherwise equipped with improvements for fire fighting. The ordinary virgin forest, especially one which has already been more or less damaged by fire, is littered with fallen trees and other débris, which make it impossible to penetrate to

A FOREST IN MONTANA KILLED BY THE FIRE OF 1910

In this fire, which swept over from Idaho, 79 fire-fighters perished. Some were killed by falling trees

different portions without roads and trails (see photos, pages 672 and 673).

A fire started by lightning or other causes in a remote place may be practically inaccessible, requiring two or three days to reach it. By that time the fire may have attained proportions which necessitate a terrific fight with perhaps a force of several hundred men before it can be subdued. Trails are therefore absolutely necessary, both in order that the forest guards can adequately patrol the forest and in order that men, equipment, and supplies can be transported quickly to all parts of the forest in case of need.

Such a system of trails is being built in the national forests as rapidly as funds are available. Already nearly 10,000 miles have been constructed. There are required, however, fully 80,000 miles more in order to establish the first skeleton system of trails. This will be equivalent to about 10 miles of trail for every township of 36 square miles.

In the long run a much more extensive development of trails will be required; but this primary system is absolutely necessary before it will be possible to really gain adequate mastery over forest fires.

TELEPHONES AND LOOKOUT STATIONS

The distances in the national forests are so enormous that, in addition to the roads and trails, there must also be a system of telephone lines. The Forest Service has already built about 7,000 miles of telephone line, but about 45,000 miles more are required to complete the primary system of control. These telephone lines enable instant communication between the headquarters of the forest supervisors and the rangers and also connect with the lookout stations. There has recently been developed a portable telephone set, which is carried by the patrolmen, so that they can tap a line at any point and report a forest fire to headquarters without having to take the time to go to a ranger station or other central point.

Still another very important development for fire prevention is the establishment of lookout stations. In the mountains advantage is taken of prominent peaks which command a view of an extensive area. An equipment is provided which enables the watchman to locate fires quickly. There is usually a firmly mounted table, on which may be placed a map of the surrounding region. A telescopic or simple alidade enables the watchman to sight a fire and at the same time to determine on the map its precise direction from the lookout station.

The watchman is always a man fully acquainted with the region and is usually able to determine on what watershed the fire is located. He immediately telephones to the ranger station nearest the fire, and a man or men are dispatched to put it out. Usually there are two or more lookout stations on a forest. When a fire may be seen from two stations in communication with each other its precise location can be fixed.

Where the topography is such that high points or natural lookout stations cannot be found, high towers are built; in some instances of rough poles; in other cases of lumber, and recently many steel towers have been constructed.

During the past season fires on the national forests have been located from lookout stations as far away as 50 miles, and as a result of the quick reporting of the location the fires have been promptly extinguished.

Still another means for fire prevention is the fire line. A dirt road is the best possible fire line, but general road construction must follow after the construction of trails and telephone lines. It is expensive work and not so immediately essential as the other development. In many instances, however, it is necessary to construct at once fire lines from which all small growth and inflammable material down to the mineral soil is removed. Some 500 or 600 miles of such fire lines have been built on the national forests.

One of the very important classes of improvements in a large forest is the ranger stations, which are well located with respect not only to the conduct of business in the forest but to fire protection. Many serious fires have been prevented because they were within striking distance of the ranger station.

With all this permanent improvement

FOREST-SERVICE TRAIL IN A DENSE MONTANA FOREST

If the forests had been fully provided with such trails the disaster of 1910 could have been either prevented or the loss reduced to a small amount. There have been built in the national forests about 10,000 miles of trails. Fully 80,000 miles more must be built for the primary system of fire protection

work done, it is then necessary that there be ample equipment to meet emergencies—fire-fighting tools, such as grub-hoes, axes, rakes, pails—and such other material as the special conditions of a given forest require. This equipment must be located where it will be most useful—at ranger stations and in special boxes located at convenient places.

It is, further, most essential that there be provision for the transportation of men and supplies in case of fire. In some cases where there are no roads and transportation is entirely by trail it is necessary to equip a forest with a pack train. Elsewhere arrangements are made in advance to hire such transportation as is needed when occasion arises.

The key-note in fire prevention is preparation. This applies not only to the development and equipment of the forest, but also to the organization of the protective force. The great difficulty in the national forests has been that the appropriations have not been large enough to permit the employment of enough guards and patrolmen.

At present the average area in charge of a single man is about 100,000 acres. In some cases of very valuable timber it has been possible to place one guard to each 30,000 acres. A single patrolman should not have to cover over 10,000 acres when the timber is heavy and valuable. Elsewhere one man to 20,000 or 25,000 acres may be sufficient if the forest is equipped with trails, telephones, and other improvements.

The Forest Service has been able to accomplish what it has only through the most careful organization and the efficient and loyal service of its rangers. Careful fire plans are prepared which provide in advance for the placing of the patrol, the coördination of the different patrolmen, the distribution of fire-fighting equipment, the securing of men and supplies and their transportation in case of fire, and all other matters which are needed in an emergency.

THE PRACTICE OF FREQUENT BURNING OF THE WOODS VERY INJURIOUS

It has been the practice in some sections of the country to burn over the forest every year or two on the theory that light annual fires are beneficial in preventing the accumulation of inflammable débris, which if allowed to gather in quantity might cause fires of great proportions.

This practice of frequent burning of the woods has been particularly prevalent in the forests of the southeast and in certain sections in California. It has been stoutly maintained by some lumbermen that this is the proper method of forest protection. These men point to the fact that trees of certain species have a thick corky bark which resists a light surface fire. Hence, it is maintained, the valuable timber is protected from fire, whereas if a thick leaf litter is permitted to gather and young pine trees to spring up a single fire would burn with such severity as to kill the old timber.

Of course, the advocates of this theory are interested only in the protection of the mature timber, and have no interest in the protection of the immature trees or the promotion of a new crop after the first is removed. It is obvious that the repeated burning of the forest destroys the young trees and altogether prevents any new reproduction. The doctrine consists, therefore, of protecting a limited number of mature trees by destroying all the young ones. When the old trees are finally cut nothing but a barren waste is left (see page 683).

This process of ultimate destruction of the forest is illustrated in many parts of those forests where the practice of annual or periodic firing of the woods has been in vogue. The insistent promulgation of this dangerous doctrine by certain lumbermen in California has acted as a real obstacle to retard the establishment of effective forest protection in that State and stands out in sharp contrast to the progressive attitude of the lumbermen of the Pacific Northwest.

THE STATES AND PRIVATE OWNERS COÖPERATING

Following the methods used by the government, many large owners of timber lands are now undertaking to protect their property from fire. In the

A RANGER STATION: SEQUOIA NATIONAL FOREST, CALIFORNIA

The forest rangers are stationed at points most convenient for the conduct of their work. Their duties include not only protection of the forest from fire, but many responsibilities connected with timber sales, grazing, construction of trails, telephone lines and other improvements, free use of timber, boundary surveys, tree-planting, etc.

FOREST OFFICERS EQUIPPING THEMSELVES TO GO TO FOREST FIRE: COLORADO

An important part of the equipment of the forest consists of the tool-boxes, located at strategic points

Northwest several fire protective associations have been formed, through which the lands of the members are handled under a single protective organization. Their example has been followed by lumbermen in certain parts of the Lake States and in northern New England. Very little progress has, however, been made among the owners of large tracts in the South.

Those States which have initiated a policy of State forests are protecting their public property from fire. These and other States have gone further and are undertaking to aid the private owners in fire prevention. The individual owner is always at a disadvantage if his neighbor is careless.

A great many States have excellent laws for the punishment of carelessness in the use of fire, but only about 14 States have developed a system of protection based on the principle of patrolling the forests to prevent fires, just as is done on the national forests. Under the system of State patrol the State does not bear the whole burden, but directs the work and contributes such an amount as will insure effective organization.

The States which have inaugurated such a system are New York, Maine, New Hampshire, Vermont, Massachusetts, Connecticut, New Jersey, Maryland, Michigan, Wisconsin, Minnesota, Washington, and Oregon. Others will soon follow. Pennsylvania has a progressive policy of State forestry, but has not yet introduced a system of patrol on private lands under State direction. These various States have not yet perfected their organizations, nor have they covered the whole forest areas within their boundaries. They have inaugurated the right policy and need now only money enough to put it into full practice.

The government extends a certain amount of direct aid to the States in protecting the forests on the watersheds of navigable streams. The Weeks law, passed in March, 1911, provided $200,000 for this purpose. The law requires, however, that no State shall receive more than it appropriates from its own treasury for fire protection. In 1911 ten States received aid from the government under the Weeks law. In 1912 probably 12 will receive such aid.

TELEPHONE CONSTRUCTION IN THE FLATHEAD NATIONAL PARK: MONTANA

The forest service has already built 7,000 miles of telephone lines in the forest reserves, but 45,000 miles more are required and will be constructed as soon as funds are available

From the foregoing it will be seen that enormous advances have been made in fire protection in the last few years. The annual fire loss is being very greatly reduced. The problem is, however, by no means solved. There is still required a great deal of public education, to eliminate carelessness in the use of fire in the forest. Many States have not yet adequate fire laws, and the appropriations for fire protection by the States and by the government are still inadequate.

A LONG-LEAF PINE FOREST IN TEXAS, 12 YEARS AFTER LOGGING, WHICH HAS BEEN BURNED REPEATEDLY

There is no young growth at all. When the remaining trees are cut the destruction of the forest will be complete (see page 679)

THE EFFECT OF PROTECTION OF LONG-LEAF PINE FORESTS FROM FIRE

Photo by Thomas Riggs, Jr.

MOUNTAINS NEAR YAKUTAT BAY, ALASKA

Mount Saint Elias is seen in the distance. From a ridge of Saint Elias the 141st meridian, defining the Alaska-Canada boundary, starts on its journey to the Arctic Ocean

SURVEYING THE 141ST MERIDIAN

By Thomas Riggs, Jr.

Engineer to the Alaska Boundary Commission

FAR to the north, in latitude 60° 20′, towering high above other mountain giants, stands Mount Saint Elias. From a ridge of Saint Elias, and running north straighter than the crow flies, is the 141st meridian of west longitude, which is the dividing inland line between the possessions of Great Britain and that of our own much-abused Alaska.

From its starting point, near Mount Saint Elias, the boundary shoots for 60 miles over the great ranges and glaciers of the Saint Elias Alps to the broad valley of the White River, where the prospector patiently drives his tunnels on lodes of copper and gold and prays nightly that the Copper River and Northwestern Railroad, now built up the Chitana River to Kennecott, may be pushed over the high Scolai Pass, thereby making his wares marketable. What is it to the pioneer if the railroad should charge as much as $75 per ton, for is not the present rate 35 cents to $1 *a pound* from Whitehorse to Canyon City, on the White River (see map, page 693).

Just south of the White River, from the summit of Mount Natazhat the eternal snows cast their last defiance at the boundary. From here even to the Arctic Ocean there exists a season of the year free from ice and cold.

The many channels and quicksands of the White River being passed, the country changes to the lower rolling hills so beloved of the white sheep, and to the low, lake-dotted muskeg marshes inhabited by the wide-antlered moose—a veritable hunter's paradise, where sheep, moose, caribou, and bear may be had at almost any time; where greyling are not caught on hook and line, but are kicked out of the water, and where the Western packer calls to the cook: "You blank stomach-robber, ain't you never no more going to cook no beans?"

Across Ladue River, where the stream flows twelve miles to go three in a straight line; past the head of the Sixty Mile River, the scene of the latest gold rush; through Alaska's pioneer diggings of the Forty Mile; into the Yukon Valley and up the abrupt north bank; across the hills of the Tatonduk, the home of the Fannin sheep; across the Nation River, and across the barren hills and ridges of the Kandik; over the bottomless marshes of the Big Black River, nightly made hideous by the long-drawn howl of the packed timber wolf; on, on, always north; over the Porcupine, skirting by Rampart House, one of Canada's most northerly trading-posts; through the lake country of the Old Crow; over Ammerman Mountain, the Davidson Range, the British Mountains; then down to the terminal monument, to be placed on the bleak shore of the Arctic Ocean—so runs the 141st meridian of west longitude; in all, roughly speaking, a distance of about 600 miles.

Working under the direction of a joint American and Canadian commission, for five years we have struggled with this, the straightest of the world's surveyed lines, and this year it was given to some, from the high summits of the British Mountains, like Moses from Pisgah, to gaze upon our goal, and to see the deep blue of the Arctic, dotted with the dazzling white of wind-driven ice-floes.

The actual visible results of the work consist of a vista 20 feet wide cut through all timber, monuments set at intervisible points not more than four miles apart, and a detailed map of a strip of country extending for two miles on each side of the boundary. At prominent river crossings and at the main points of travel, the monuments are 5-foot aluminum-bronze sectional shafts, each weighing about 300 pounds and set in a ton of concrete. At less important points are the 3-foot aluminum-bronze cones set in about 1,500 pounds of concrete. All monuments are geodetically determined and will be the bases for future surveys of Alaska.

The maps, when published, will be among the finest of their kind in the

Photo by O. M. Leland

BOUNDARY PEAKS FROM A TRIANGULATION STATION

On the coast the boundary jumps from peak to peak at an approximate distance of ten marine leagues distant from tidewater. These peaks need not all of necessity be climbed, but may be geodetically determined from triangulation. Even this work calls for the most strenuous sort of mountain climbing.

world; besides showing the differences of elevation and drainage, they will also differentiate, by means of symbols, between the various growths of timber and show their density. The character of the country, whether of swamp or tundra, will also be shown. A line of precise levels, run from tidewater to a point on the boundary, furnishes the initial elevation for mapping, whence elevations for triangulation are taken and extended trigonometrically both north and south.

This survey has probably had more obstacles to overcome than almost any other survey of recent times. In the first place the meridian is crossed in only two places by possible routes of water transportation—at the Yukon River and at the Porcupine. For 225 miles south of the Yukon, supplies, forage, camp outfit, instruments, and personal effects must mainly be carried on the backs of horses. An occasional road, knee deep in mire, over which a six-horse team can barely pull their 40 hundred, will run out a short distance from such places as Dawson or Whitehorse, but the main reliance of the party is placed in the pack-train wending its snaky way over hill, tundra, and swamp. Two miles an hour is the average speed of this freight train, and six hours a day is considered long enough for a horse to carry his heavy burden.

On a forced march of

nearly 300 miles, my train of 56 horses averaged about 16 miles a day for 17 days, but the trail was frozen and hard and frequent caches of grain were on the line of travel. Another time, late in the autumn, coming from 30 miles north of the Arctic Circle to the Yukon River, we were 23 days on the trail, a distance of not more than 200 miles. Of the 75 horses with which we started, only 44 reached the river.

Eight days out from the Yukon we abandoned everything possible in the way of camp equipment; six days out and every man in the detachment of 30 men was forced to carry his 20 pounds; four days out, in a blinding snow-storm, one of the topographers set out to get a train of 12 horses which had preceded the main train. He started at 10 one morning, reaching the Yukon camp in time for breakfast the next morning. He had forded two raging torrents in the night and crossed a high summit deep in snow. The relief train met us two days out, bringing the precious grain.

In summer one can fight mosquitoes and keep fairly comfortable, but in the long retreat after the dark nights have come, when snow covers the trail, when ice is thick enough to just break through with the weight of man, when the wolves howl around the camp, when in the morning huge fires must be built to thaw out tents and pack-rigging, while packers freeze their fingers tying packs on dejected and shivering ponies—then the true spirit of the man is manifested and the "cheechako," as the tenderfoot is called, shows whether he is worthy of the life of a sur-

Photo by O. M. Leland

VIEW FROM SUMMIT OF BOUNDARY PEAK "6000" (SHOWN IN PRECEDING ILLUSTRATION), SHOWING A BOUNDARY PEAK AND ANOTHER TRIANGULATION STATION

Photo by O. M. Leland

BOUNDARY MONUMENT NEAR THE SALMON RIVER

Photo by O. M. Leland

A TRIANGULATION STATION

Photo by O. M. Leland

WORKING ON THE COAST BOUNDARY: PREPARING TO CROSS THE DE BLONDEAU GLACIER

veyor, or whether his adventures in life should be limited to the selling of pink and blue ribbons.

Not uneventfully has the boundary between Alaska and Canada been run. Fire, shipwreck, accident, disease, and death have trailed the footsteps of the surveyor.

During my first season on the 141st meridian, while in camp on the Yukon River, I was suddenly called from my instrument by the cook shouting that a body was floating in the river. Sure enough, bobbing serenely along with the current was an unmistakable black object. Hurrying into a canoe, we tied a rope to the body and towed it to shore. It proved to be the body of an ex-dog-driver of the Northwest mounted police, who had been drowned at Dawson some four weeks previous. For the sake of the astronomic work, the wire had been tapped at the boundary and we were in communication with Dawson, the nearest Canadian town, and with Eagle, which is on the Alaskan side. With characteristic promptness an officer of the police appeared on the scene.

Captain Tucker, of the police, instituted a coroner's court on a stump and took evidence.

"Where was the body landed?"

"Just below the boundary."

"Sorry I can do nothing in the matter, as the body was found on the Alaskan side."

Captain Tucker packed up his papers and went home.

I went to Eagle and interviewed the United States commissioner. Yes, he was very sorry, but in the Alaskan code there is no provision for burying the dead. In effect both governments said: "He's all yours; we don't want him." We knocked together a rude coffin, made from packing boxes, wrapped the poor, discolored body in canvas, and lowered it into a shallow grave back of the old Boundary Creek road-house. There was less profanity than usual at supper that night.

Pope and I traveled down the Big Black River on a raft last year to a triangulation station. While walking back a sudden storm overtook us near one of the little trap cabins frequently found in the most unexpected places. We broke in and waited until the fury of the storm was past. On the cabin door were written the names of two men, with the information that they had left in June and would be back in September.

This year a broken raft on a log-jam, a torn tent, and a rusted rifle were found far below the little lonely cabin, but the men themselves have never been seen.

Photo by O. M. Leland

BOUNDARY PEAK "5300" FROM A TRIANGULATION STATION

Such tragedies are common in the North.

The survey party itself has paid toll. Two efficient, energetic young American surveyors have been cut off in the prime of their life as a result of hardship and injury received in the line of duty. The Canadians have lost one of their brightest chiefs of party. A cry and a dark shape hurtling through a thousand feet to a glacier below was the last of another of their adventurous mountain climbers. Two are in pauper asylums for the insane.

While there is much that is grim in the life of the pioneer, still there is much to enjoy.

This year, landing at Rampart House, a scene of wild excitement ensued among the Indians. Never before had they seen so many white men, never a horse, never a steamboat; and when, without tow-line or sail, the little steamer *Delta* nosed her way up the Sunaghun Rapids, spitting smoke and steam from stack and pipe, their wonder was unbounded. A hundred white men—it was incredible. They pressed around, each one eager to be the first to shake hands and say "How do," all the English they knew.

On the high bank stood the log store, surrounded by the various buildings of the trading-post, for all the world like the posts of the "Honorable Company of Gentlemen Adventurers of England trading into Hudson's Bay" of a hundred years ago. Beneath the tall flagpole, from which waved the flag of Canada, in bold relief against the white-mudded buildings, stood the picturesque figures of the trader and his head assistant, moccasin on foot and the red toque set jauntily over the weather-beaten face, with the high cheek bone and steady eye of the North.

The steamers *Delta* and *Vidette* disgorged their cargoes of men and horses. As the horses were turned loose to run and roll in the flat back of the Indian village, a wild scramble ensued. Hundreds of dogs fled

Photo by O. M. Leland

SURVEYORS NEAR THE BASE OF BOUNDARY PEAK "5300"

The boundary tribunal selected certain mountains, which were designated as boundary peaks; "5300" refers to the approximate elevation

Photo by O. M. Leland

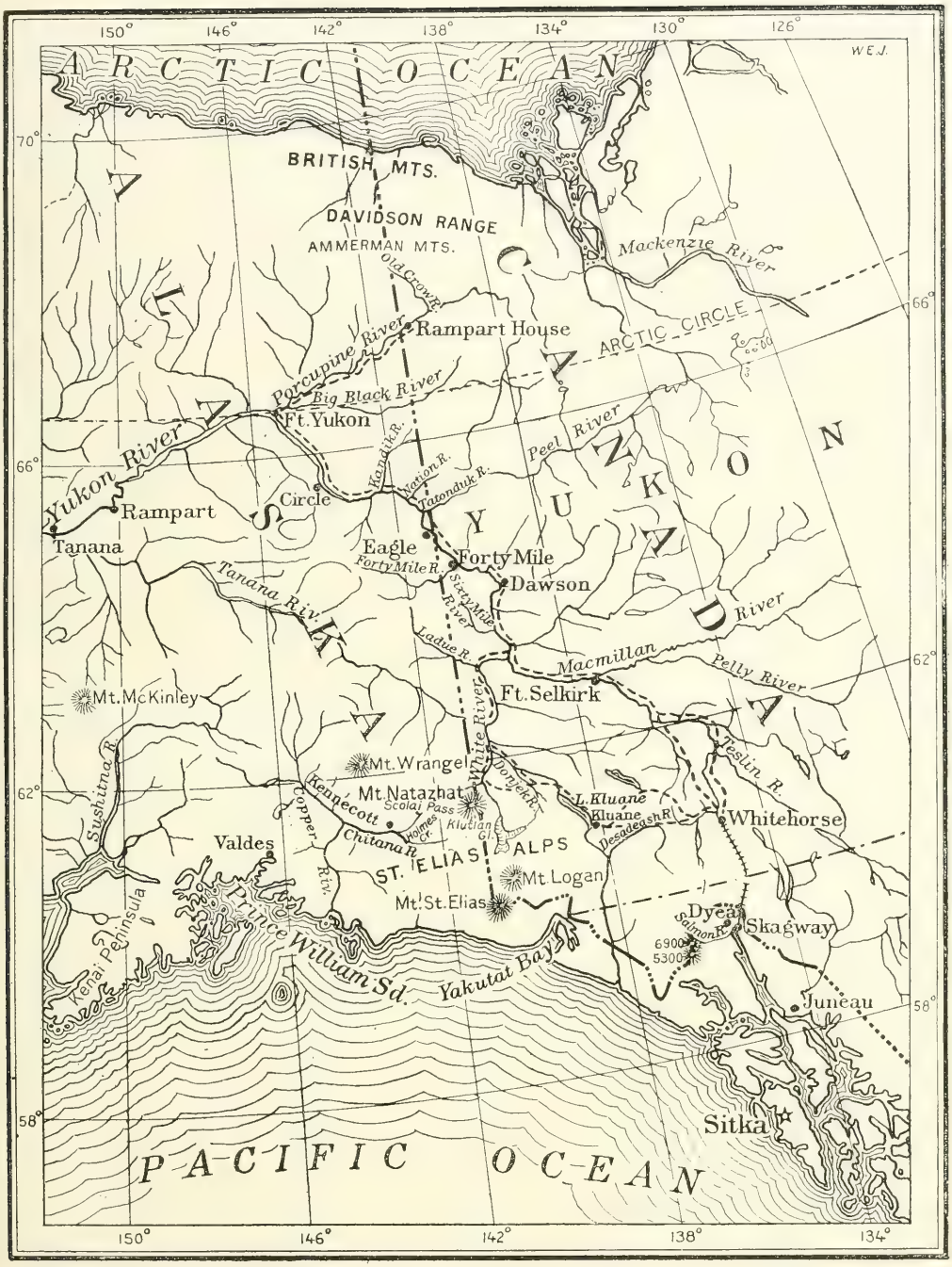
SURVEYOR'S CAMP FAR UP ON A MOUNTAIN SIDE

Photo by O. M. Leland

SURVEYOR ASCENDING BOUNDARY PEAK "5300"

Photo by O. M. Leland

CLIMBING A CREVASSE ON A SNOW BRIDGE WHILE ASCENDING "5300"
Note the heavy packs borne by the surveyors



OUTLINE MAP SHOWING ALASKA-CANADA BOUNDARY LINE

The heavy black line along the 141st meridian denotes the completed part of the boundary. The coast boundary, ending at Mount Saint Elias, is practically completed. The dotted lines show the routes followed from Whitehorse when going to the field.

"The maps, when published, will be among the finest of their kind in the world; besides showing the differences of elevation and drainage, they will also differentiate, by means of symbols, between the various growths of timber and show their density. The character of the country, whether of swamp or tundra, will also be shown. A line of precise levels, run from tidewater to a point on the boundary, furnishes the initial elevation for mapping, whence elevations for triangulation are taken and extended trigonometrically both north and south."

ON THE ROAD TO THE WHITE RIVER FROM WHITEHORSE: STUCK ON THE BEAR CREEK SUMMIT

One year an overland trip of 300 miles had to be made from Whitehorse to the White River before the parties could get to work. A start was made on May 1, before the snow had disappeared from the hills. In consequence the wagons were badly stuck in many places

A BAD MUDHOLE ON THE WAY TO KLUANE

Photos by W. R. Tuckerman

Sometimes a wagon would not go 50 feet without getting mired; then all hands would pry with long levers, while the teams would be doubled up. Ten horses are shown on this small load

Photo by F. Lambart

THE BOUTELLIER SUMMIT ON THE ROAD TO LAKE KLUANE

Lake Kluane is at the end of a so-called wagon road from Whitehorse, and 150 miles distant. The lake itself is 25 miles from end to end. This was made in a few hours, while on the return along the shore it took two days by pack-train.

to the hills, not to be seen, but to be heard for several days. Within 10 minutes not an Indian was to be seen. In their cabins, behind barred doors, for two days they whispered of the strange hornless caribou that wandered at will among the houses, kicked down their tents and upset their caches. At last the braver ones ventured forth, and before long the children were throwing stones at their former bogies.

A few days to sort supplies and stores, and then, with the bucking of green horses and the din of bells, the parties one by one faded over the hill and into the unknown North.

The American and Canadian parties, consisting of anywhere from 30 to 50 men each, do not operate as one large party. Instead numerous subparties are organized, averaging about seven men to the party, each in charge of a veteran surveyor, each one complete in itself and independent of the others, each with its own cook and pack-train. The only party which in any way could be called a joint party is the one determining the main points on the meridian. In this there are both American and Canadian surveyors, whose individual observations must check each other before the boundary is decided upon.

Long before the field is reached, the list of outfit is given to each chief of subparty, showing his share down to the last teaspoon and pound of flour. It is then up to him to see that his supplies last through the season. As provisions are brought to his camp by the supply train, they are checked from his allowance. In this way is avoided the game of "grab." Cooks and packers are notorious in this respect, and I have yet to see the cook or packer who did not think that his share of luxuries or forage was much less than that of some other cook or packer.

Between the surveyors exists a generous rivalry. Never in the history of the survey has any chief of party been found guilty of shirking work; instead he is always trying to do just a little more than the other fellow. This spirit soon permeates the entire force. At the start of

SKIRTING AN OVERFLOW ON THE ROAD BETWEEN WHITEHORSE AND KLUANE

Photo by W. R. Tuckerman

CROSSING LAKE KLUANE: A PRESSURE CRACK

Photo by W. R. Tuckerman

FOLLOWING THE BANKS OF THE DONJEK RIVER Photo by W. R. Tuckerman

Good time was made when it was possible to travel on the ice. The glare is intense and snow blindness in consequence is common

ON THE ROAD TO THE WHITE RIVER: THE ALSEK MOUNTAINS AND THE VALLEY OF THE DESADEASH

This valley will undoubtedly some day be a great farming country. Photo by W. R. Tuckerman

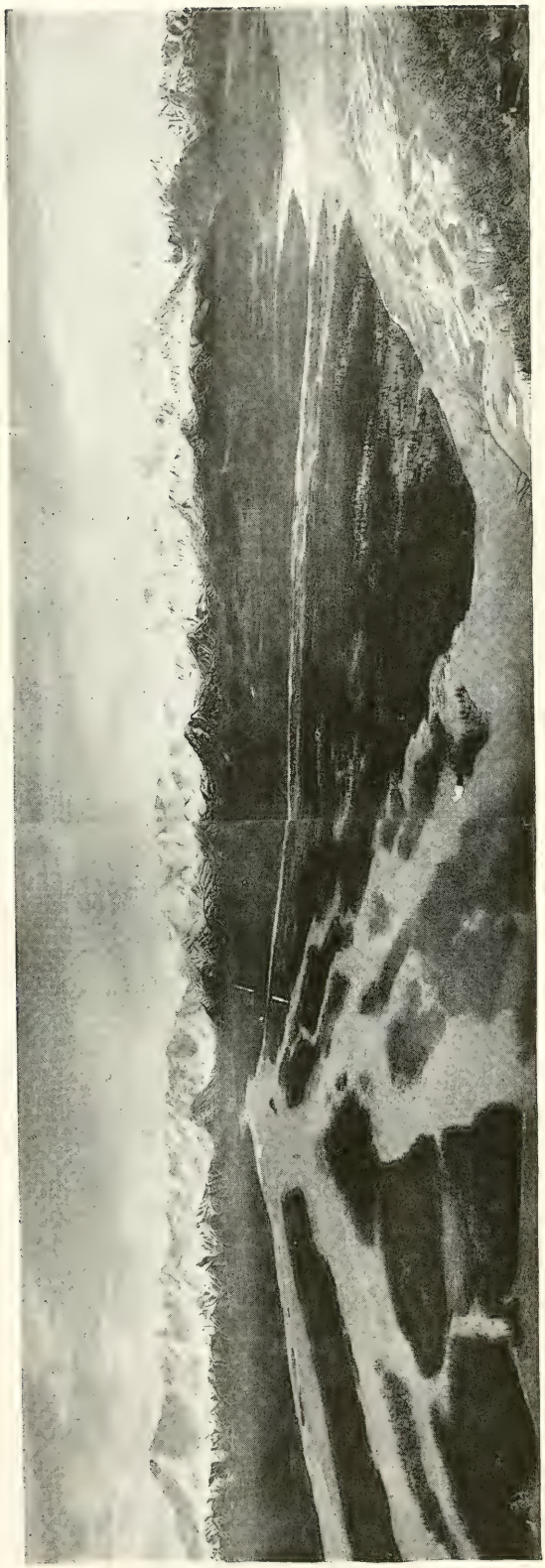


Photo by D. W. Eaton

MOUNT NATAZHAT AND THE MOUNTAINS TO THE WESTWARD

Holmes Creek flows from the mountains to the west of Natazhat. This was the divide crossed in the attempt to climb the mountain. The White River, full of dangerous quicksands, is shown in the right-hand corner of the photograph

the season, a green hand will sometimes complain of long hours and heavy work, but the older employees will not tolerate a loafer, and before many days he has caught the survey spirit, "That the man who is always willing to take the worst of it will find every other man always willing to take the worst of it."

Sundays do not especially exist as a day of rest, unless it is storming too hard to even move camp. To be sure, breakfast is had at 7 instead of at 6, and the men usually return to camp by 5. This applies to the Fourth of July and other holidays as well. Not a day can be wasted, for at the best a field season is only of 100 days' duration.

Incident there is in plenty, but it is soon forgotten in the next.

Reaburn, in advance of the main party, was going to Eagle from Dawson by canoe just after the opening of the river. Where the river narrows above Forty Mile there was a jam of ice. There was no chance to make the shore, so he headed for what appeared to be the most solid part. As he struck he drew his canoe onto the ice. When asked what he did next, he answered, "Got into the canoe and went to sleep." This with the ice cracking and breaking all around him.

Hardly a year goes by that some man does not get treed by a bear, and that special bear is always the largest bear in Alaska.

A pack of timber wolves tried to be friendly with a couple of packers on the Black River, but were beaten off.

That Providence which watches over babes and drunken men must also watch over surveyors, for with the risks which are taken I can-

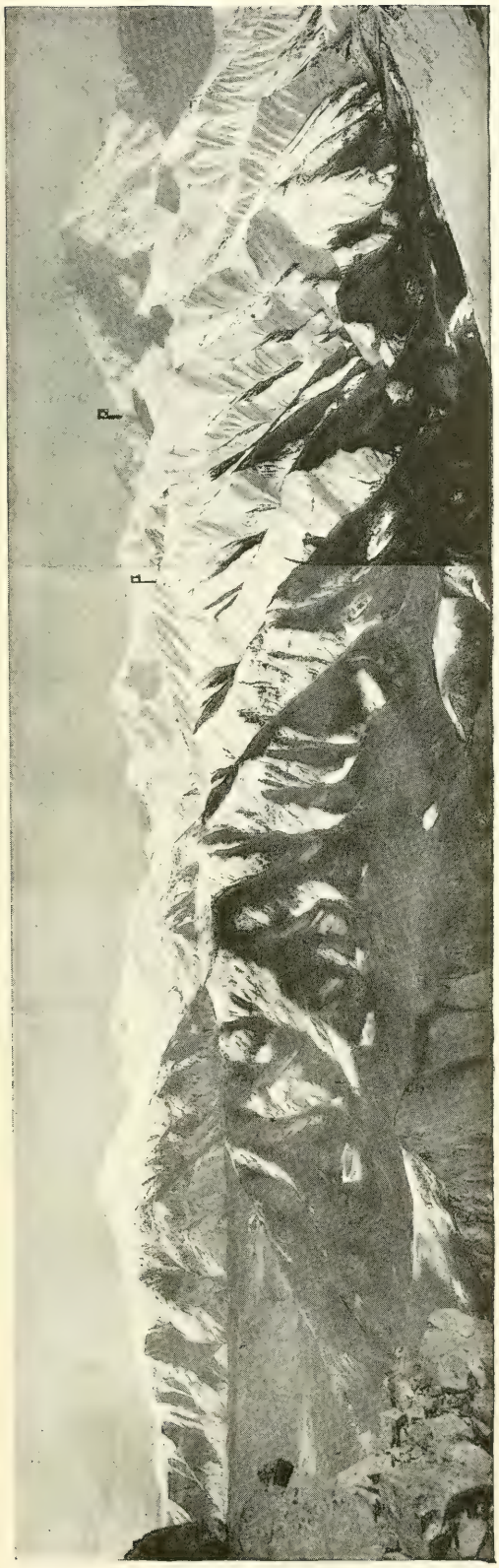


Photo by D. W. Eaton

MOUNT NATAZHAT FROM THE NORTHWEST

The Natazhat Range is the last of the perpetually snow-capped mountains along the 141st meridian

not explain why a dozen men have not been drowned or killed. With enough experiences each to furnish food for conversation for a lifetime, if you were to ask Reaburn, Gilmore, Ryus, Guerin, or Baldwin to relate some adventure they would not be able to recall one little one, for like Percy, the Machination Man of the Sunday supplements, "Of imagination they have nix." They are not parlor explorers or lecture-room adventurers. It is simply their life.

A steamboat wreck in the Thirty Mile River, freight gone astray, water too low to allow navigation for river steamers, caused Craig, the Canadian chief of party, and me to muster our fleet, consisting of the American power boats *Midnight Sun* and *Frontiersman* and the Canadian *Aurora* and *Pelican*, on the lower river to bring up supplies for the clamoring parties. Craig had gone to Fort Yukon, while I, with a relief cargo of 10 tons, on the *Midnight Sun* was pushing steadily and noisily up the Porcupine.

One day out from Rampart House we met the *Frontiersman*, the pilot of which brought an indefinite rumor of that most dreaded of all diseases among the Indians, smallpox. At Rampart House the rumor was confirmed. The little daughter of the Indian preacher showed a well-defined case. Our surgeon, Dr. Smith, had isolated the patient on the island, but no other steps had been taken.

It was a difficult problem. The boundary line with which we were taking such pains stood in the way. Here we were only 500 feet over in Canada and all Canadians away; but something had to be done to stop the spread of disease to the parties and to the surrounding country.

We debated five minutes. Stores were hurried to the *Midnight Sun*, telegrams to Dawson and to Washington written, and the *Midnight Sun* shot out into the rapids

Photo by Thomas Riggs, Jr.

MAPPING IN THE FOOTHILLS OF MOUNT NATAZHAT

Mapping is all done by the plane-table. While it is not necessary for the topographer to climb every hill, still he must choose his stations so as to see into every little draw to be mapped. This station is on the brink of an extinct volcano at an elevation of about 6,000 feet.

with hurry instructions to find Craig and place herself under his orders, while the writer and two others remained to help fight the smallpox.

The whole tribe was washed with antiseptic and, to the Indian mind, that strange and useless article—soap. Fresh clothing and supplies were issued to the members of the infected camp, who were isolated in a clean camp back of the Indian village. The camp in which smallpox started and the adjoining camps were burned with all their cherished possessions. There was some discontent manifested as precious furs and beadwork disappeared in smoke, but this was promptly squelched with threats and a display of handcuffs. There were only three of us and we had to take a high hand.

Within nine days a tired crew of the *Midnight Sun* tied up in the eddy, but with them were Craig, a member of the Northwest mounted police, a male nurse, and vaccine. Without waiting for any confirmation of Craig's wire from Circle, the Dawson authorities had hurried the two men on board the first steamer, our launch had met them at Circle, and, by running day and night, had landed at Rampart House in record time. All expenditures were approved and our already established quarantine authorized. There are no half-way measures with the Canadian government in an emergency.

Thirteen days elapsed before there was another case, and for a time we thought that the trouble was over, but the Indians had all been exposed and now came down by families. The island assumed the appearance of an army bivouac. The Indians were all brought in from the hills and placed under supervision to prevent their scattering all over the country.

There is no law in Alaska to protect the community from an epidemic, so we arbitrarily took it and forced inspection and vaccination over a radius of 100 miles. Fortunately large quantities of supplies and clothing had been brought in for the use of the joint parties; these

Photo by Thomas Riggs, Jr.

SURVEYORS CLIMBING ONTO THE KLUTLAN GLACIER

The newly fallen snow covering the crevasses made the crossing of the glacier extremely dangerous. All three members of the party fell through several times, which, when carrying a hundred-pound pack, is decidedly unpleasant.

Photo by F. Lambart

CAMP ON THE SIDE OF MOUNT NATAZHAT: ELEVATION, ABOUT 9,000 FEET

Drying out all our changes of clothes the morning after the snowstorm

MOUNT NATAZHAT FROM THE NORTH (SEE ALSO PAGES 698 AND 699) Photo by W. R. Tuckerman

Taken from an elevation of 7,000 feet. Mount Natazhat is 13,400 feet high

THE PACK-TRAIN ON THE TRAIL Photo by W. R. Tuckerman

The load weighs from 150 to 250 pounds, depending upon the strength of the horses and the character of the trail (see pages 686-687)

Photo by F. Lambart

SURVEYOR'S CAMP ON THE KLUTLAN GLACIER

were issued as needed. Had these supplies not been at hand the Indians could not have been controlled and a general outbreak of smallpox all over the Yukon would have been the result.

Now came the problem of getting the parties from the field without bringing them in contact with contagion. Pope and I gathered in both the Canadian and American parties and sent them across an unknown country, to hit the river far below the Rampart House. Craig stayed on the lid. Then, while Craig and a few of his party went into a two weeks' iso-

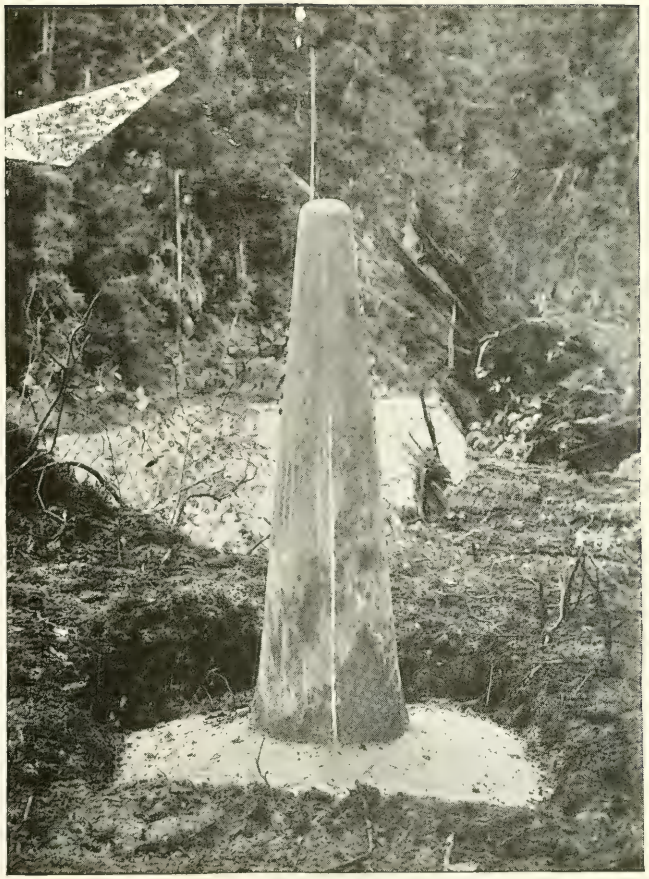


Photo by D. E. Eaton

TYPE OF ALUMINUM-BRONZE CONICAL MONUMENT USED FOR MARKING THE LESS IMPORTANT POINTS ALONG THE BOUNDARY

Photo by Thomas Riggs, Jr.

CAIRN SIGNAL ON THE DIVIDE BETWEEN THE TWO MAIN FORKS OF LADUE RIVER

Photo by Thomas Riggs, Jr.

A CACHE

Unless supplies are placed on an elevated platform of this description, bear and wolverine will soon destroy anything left along the trail

Photo by Thomas Riggs, Jr.

A WONDERFUL SET OF HORNS

Although we were out of fresh meat at the time, every one was glad that there was nothing more deadly than a camera around when this great caribou stuck his head over the skyline

Photo by D. A. McKinley

ON A TRIANGULATION STATION ALONG THE 141ST MERIDIAN

While working around a theodolite it is almost impossible to wear hat and veil, so a bandana handkerchief is usually tied around the head as a slight protection against mosquitoes.

Photo by Thomas Riggs, Jr.

WHITE RIVER WEST BASE

To see over a hillock or a clump of trees it is sometimes necessary to build a triangulation station of this description. The instrument is placed on the center tripod, which is separate from the observing platform surrounding it. The observer can then walk around his instrument without jarring it.

Photo by M. W. Pope

In summer the Indians utilize their dogs for packing. This particular pack weighs about 30 pounds. The dogs are always loaded with all they can stagger under

Photo by A. I. Oliver

Mosquitoes are so thick that unless some protection is given the horses cannot graze. The style of net for man is shown. The ends of the bib to which the net is fastened in the back and front are tied under the arms.

Photo by Thomas Riggs, Jr.

TOPOGRAPHER AT WORK ON THE ARCTIC CIRCLE

On June 22 the boys wanted to work all night. This is a snapshot at midnight

Photo by W. B. Reaburn

THE ARCTIC RANGE, OR BRITISH MOUNTAINS

This range runs very close to the coast at the boundary, the foothills coming to within only a mile or two of the ocean. The higher summits are about 7,000 feet high, and are perfectly bare of snow in summer. Timber ceases at this range, and the survey parties have to burn oil from here to the coast, where driftwood from the Mackenzie River can be picked up. A peculiar feature of this range is the large amount of coral and other sea fossils to be found.

Photo by Mrs. Herbert Wadsworth

INDIAN WOMEN AT RAMPART HOUSE WATCHING THE APPROACH OF THE STEAMER "VIDETTE" (SEE PAGE 690)

Photo by Thomas Riggs, Jr.

THE SURVEY LAUNCH "MIDNIGHT SUN"

Length, 50 feet; beam, 8 feet; draft, 18 inches; 25 horse-power gas engines. Pushing a barge, this little craft can transport from 10 to 15 tons. She did great service during the summer freighting on the Porcupine and Old Crow rivers and later in bringing the lumber for the hospital to quarantine (see page 710).

Photos by M. W. Pope

DAILY INSPECTION FOR SMALLPOX: VACCINATING INDIANS (SEE PAGES 699, 700, AND 703)

The adult Indians submitted to the inspection without any complaint, but the little ones had to be bribed with candy, a sackful of which was taken out every day. Soon they hailed the inspection as a great event.

lation, came my turn. Reaburn, one of our surveyors, commonly known as the "Old Sleuth," and five others of the party volunteered to stay in during the winter for the purpose of storing and forwarding supplies for the next season and for looking after the Indians.

In response to a telegram, the Canadian authorities at Dawson had sent lumber for a hospital and carpenters, but, owing to low water, the steamer *Delta* was unable to bring it nearer than 60 miles of the camp. At this point the *Delta* dumped it on the beach and took on the parties and their outfits. The lumber was brought up by the *Frontiersman* and the *Midnight Sun*.

Late in September, when it had become dangerous to stay longer, Pope and I left Rampart House on the *Frontiersman*. At the "Aurora's Goat" rapids we met the little *Midnight Sun* with the last of the lumber, struggling bravely against the current. The thousand feet of lining wire was covered with a glaze of ice, one drive-chain was lost, two wheel-buckets were broken and patched, her house and wheel casings were encrusted with ice, but the undaunted crew drove her to quarantine (page 709).

The erection of the hospital undoubtedly saved the lives of many of the 92 afflicted Indians.

At the time of my leaving there had been but one death. Amos Njootli, an ordained priest of the Church of England, although himself smitten with smallpox, read the

DR. SMITH ON THE WAY TO VISIT SMALLPOX PATIENTS

When in contact with smallpox patients the doctor always wore a cotton shirt covering his clothing, which was thoroughly disinfected after each visit.

FUMIGATING

After being among the smallpox Indians, all hands would be fumigated. This was done by getting in an air-tight tent, all except the head. About eight ounces of formaldehyde were then evaporated inside the tent. After about 10 minutes the germs were all considered dead.

Photos by Thomas Riggs, Jr.

SMALLPOX CAMP ON EDMONDS ISLAND

With the exception of the nurses' tents, which are shown in the center of the picture, every tent shown contained one or more cases of smallpox when the photograph was taken

Photo by M. W. Pope

ONE AND A HALF CORDS OF FUR AT RAMPART HOUSE AWAITING SHIPMENT

The precious furs of fox and sable have been sent to London. The furs seen here are mostly muskrat, about 17,000 of them

Photo by F. Lambart

THE HOME OF THE SQUAW MAN

Seemingly perfectly contented, the squaw man is found in most unexpected places. They are usually kind to their wives and devoted to their children. They eke out an existence by trapping, mining, or guiding hunting parties.

burial service in the Indian language. The body was laid away in a grave on the bluff overlooking the river, while the whole population of the island joined in the singing of a weird interpretation of "Nearer, My God, to Thee."

The Indians of this country are nominally all Christians, and are visited every year by Bishop Stringer, of the diocese of the Yukon. Many are communicants of the Church of England. They are also communicants of any other church with which they may have come in contact. They also hold fast to many of their old customs, and in consequence we shall probably have to pay for the one person who died, or take the chance of a shot from ambush.

With it all there is an unexplainable fascination about the North. The very hardships lend a paradoxical charm. The vast solitudes, uninhabited and lonely, have an irresistible call. The surveyor dreads the day when he shall have thrown his last diamond hitch, broken his last camp, and, from the deck of a homeward-bound steamer, have watched a free life fade away in the mist with the distant hills.

WHERE OUR BANANAS COME FROM

By Edwin R. Fraser

THERE exists a legend relative to the Christian inhabitants of the East, that they believed the banana to be the tree of the source of good and evil, in a bunch of whose fruit the serpent that tempted Eve hid itself, and they add that when Adam and Eve became ashamed of their nakedness they covered themselves with the leaves of this plant. Beyond all doubt this legend had some influence upon the minds of those early botanical classifiers who designated two species of the plant by the names of *Musa paridisiaca* and *Musa sapientium*—Fruit of Paradise, Fruit of Knowledge.

The origin of the banana is given as India, at the foot of the Himalayas, where it has been cultivated since remotest antiquity. Its origin in the New World is as doubtful as the origin of the American Indian. Natural to Asia and Africa, where more than 20 distinct species of the genus are known, it is said to have been brought first to America from Spain, early in the sixteenth century, and planted in the island of San Domingo, whence its spread was rapid throughout the surrounding islands and the mainland. This has never been authentically established, however, and some authorities include the banana among the articles that formed the base of the food supply of the Incas and the Aztecs before the arrival of the Spaniards. Certain it is that throughout the whole of meridional America there is a strong tradition that at least two species of the plantain were cultivated long before the coming of the Europeans. Furthermore, it is singular that in all the languages indigenous to the region where the banana appears, that plant has a special name, not proceeding from the conquerors, as was the case with the names of many other plants, animals, and various articles introduced into America after its discovery.

Grown over the entire extent of the meridian of the earth, the fruit of the banana today forms, in large part, the principal food of a majority of the peoples living under the tropical zone. Several species and numerous varieties of the plant appear throughout tropical America, but it is cultivated for commercial purposes in appreciable quantities only along the Atlantic border, from southern Mexico to Colombia, in Jamaica, Cuba, San Domingo, and the Bahamas, the far western markets of the United States being supplied from the Hawaiian Islands and Mexico's south Pacific coast.

The lowlands adjacent to Costa Rica's eastern coast present a combination of soil and climate that is perfectly adapted to the cultivation of this plant. It thrives best under conditions of extreme heat

Photo by Edwin R. Fraser

THE CHINESE DWARF GUINEO, OFTEN PLANTED IN THE GARDENS AND PLAZAS OF THE TOWNS AS AN ORNAMENT
The negroes use the leaf as an umbrella. The ribs of the leaves are woven into cloth by the Filipinos

Photo by Edwin R. Fraser

A BUNCH OF PLANTAINS

The stem grows out of the top of the plant and shoots over to the side

Photo by Edwin R. Fraser

A TYPICAL BANANA FOREST IN COSTA RICA

Note the long stem and flower tipping the bunch of bananas in the left center of the picture; also of the bunch in the upper left corner

and humidity, a temperature below 75 degrees Fahrenheit or an elevation more than 1,500 feet above sea-level retarding its development.

The frequent showers, interspersed with hot sunshine, peculiar to eastern shores in the tropics, give the plant its ideal environment, and it may be counted a certainty that where climatic conditions favor the banana it is extremely unhealthful for the white man. Of prime importance, also, is a rich soil, clayey and sandy soils rich in humus and alluvial deposits being required.

Given the requisite soil and climate, the banana requires little attention, producing fruit every month in the year, and is self-propagating by means of suckers, which continually shoot off from the mat at the root of the mother plant. Under cultivation these suckers are kept down, as the welfare of the mother plant demands, from three to five to each mat being allowed to remain, coming on from three to five months behind the parent, and so on in perpetual succession. Sometimes more than a dozen suckers, in groups of different ages, may be seen in a single mat.

Photo by Edwin R. Fraser

THE FLOWER OF THE BANANA GROWS AT THE TIP OF THE STEM, BEYOND THE FRUIT

The occurrence of four flowers on a stem is extraordinary, one being the rule

At the age of 10 to 11 months the fruit is gathered, and consists of one bunch or stem to each plant, the fruit being arranged around a fibrous stem in layers, called hands, with 7 to 12 hands, or 15 to 25 fingers to the stem, the total averaging 12 dozen bananas. This stem grows out of the top of the plant, being, in fact, a continuation of it, and, by the great weight which it bears, shoots over to the side, with its upper end extending downward (see pictures, pages 716, 717). The stem is elongated from two to three feet beyond the fruit and is tipped by a formation of matted purple leaves, in the shape of a spear point, which is called the flower.

The plant, now shortly dying naturally, under cultivation is cut down, to give place to its three to five successors, that being the number usually grown in each mat. For planting new areas the young suckers are cut off close to the mat and transplanted in holes 20 inches deep and 15 feet apart each way.

Several distinct species, known as the plantains, the *Musa paridisiaca* being the most common, occur in numerous

variety throughout the American tropics. One of these, the "Five Hundred," is noted for the enormous size of its stem, frequently reaching more than 12 hands, with over 200 fingers, and when the fruit is small there are sometimes from 300 to 500 on a single stem. A San Domingan variety, on the other hand, produces bunches of only 10 to 25 fingers, each plantain a foot long and weighing from two to four pounds.

In general the fruit of the plantains is more fibrous in texture and larger than that of the *Musa sapientium,* which is the species most widely cultivated for export, and nearly all varieties of which are commonly referred to as the banana. Most of the former are cooked green, few of them being edible raw, while the latter, because of its superior flavor and the high percentage of sugar which it carries, is in high favor as a table fruit.

The species *Musa sapientium,* of Indian origin, is represented in America by many varieties, each differing from the other slightly in size, shape, color, and flavor of fruit, and the number to a stem. It has greater resistance than other species, produces bunches more compact and regular, of a uniform weight and size, that stand transporting better, and the fruit is well formed and succulent.

In Costa Rica the species ordinarily attains a height of 25 feet from the ground to apex, although it frequently reaches 30 feet, and has been known to increase in height three feet in a single month. The Congo variety grows to 18 feet, while the dwarf guineo, indigenous to China, reaches but six to nine feet, with very small fruit. The latter is much admired for the beauty of its leaf and is frequently found in the patios of the homes and the public plazas of the towns, where its influence is commanding, exerting a truly tropical charm.

The total area to bananas in the several districts adjacent to Costa Rica's Atlantic seaboard is approximately 80,000 acres, one-third of which is owned and cultivated by the United Fruit Company. Altogether there are some 200 small outside growers of the fruit, for the most part Americans and Europeans, a few of whom have holdings reaching several thousand acres each. The line of railway connecting the banana belt with tidewater being controlled by the United Fruit Company, all outside fruit grown in the country is sold to that company, nine-tenths of it being grown under contract for the company to purchase at a price agreed upon in advance, which ranges from 15 to 30 cents gold per bunch, according to grade. The company also owns a large fleet of specially constructed ships, which carry the fruit to overseas markets.

Costa Rica at present exports annually, in round numbers, 10 million bunches of bananas, and this quantity is exceeded only by that of Jamaica, which is approximately 12 million. It is probable the latter figures will soon be equalled in Costa Rica, when the large areas of new ground now being brought under cultivation become productive. During the busiest season an average of a steamer a day leaves Port Limón with fruit for the American and English markets, the exportation sometimes reaching a total of over a million bunches in a month.

Of the country's exports, approximately four-fifths go to the United States and one-fifth to England. Of the fruit sent to the United States, nearly one-half enters through New Orleans, which is the most important banana port in the world, with a total importation of a little less than 14 million bunches during the fiscal year ended June 30, 1911, one-fourth of which came from Costa Rica. The remainder of the product is taken by Boston, Mobile, and New York, in the order named.

The fruit is cut green, at different stages of development, depending upon the market for which it is intended. That destined for New York and Boston, a large part of which is consumed at those ports without an additional haul by rail, is cut at a more advanced stage of development than fruit going to more distant ports, or which is to be reshipped to the interior by rail. Thus a large proportion of the fruit entering at New Orleans and Mobile is cut at an earlier stage of development than that sent to New York; the fruit for the English markets is cut still less mature. The first is called "full" fruit, the second "three-quarters full," and the last "three-quarters."

Photo by Edwin R. Fraser

CUTTING BANANAS

Note the great height of the trees. They sometimes reach 30 feet. Also note the huge size of the leaves

Photo by Edwin R. Fraser

CUTTING BANANAS

The top of the tree is pulled down with the pole and the stem cut with the *machete*. Note the flower at the end of the bunch of bananas

Photo by Edwin R. Fraser

CUTTING BANANAS

The tree bears but once, after which it is cut down and is succeeded by the young suckers growing out from its roots

Photo by Edwin R. Fraser

FIRST-GRADE FRUIT

Each bunch has from 120 to 180 bananas, the average being 144. Every farm is provided with its own tramway leading to the railroad. All the work on the banana plantations of Costa Rica is done by Jamaican negroes

Photo by Edwin R. Fraser

FRUIT AT RAILWAY AWAITING TRANSPORTATION TO THE WHARF AT PORT LIMÓN

Photo by Edwin R. Fraser

BANANAS COVERED WITH THE LEAVES OF THE PLANT FOR PROTECTION FROM THE SUN

Photo by Edwin R. Fraser

LOADING BANANAS ABOARD A FRUIT TRAIN IN COSTA RICA

Photo by Edwin R. Fraser

BANANAS AWAITING TRANSPORTATION BY RAFT DOWN STREAM TO RAILWAY

Photo by Edwin R. Fraser

TRANSFERRING BANANAS FROM CAR TO SHIP AT PORT LIMÓN, COSTA RICA

The fruit must be handled with great care to prevent bruising. The Jamaican negro is experienced in all branches of the industry. The fruit is carried over canvas rollers and into the ship's hold; 2,000 bunches per hour are loaded or unloaded by this means

Photo by Edwin R. Fraser

A WASHOUT ON THE RAILWAY

Costa Rica is a land of torrential rains and riotous rivers

As all fruit is sold delivered at the railroad, each farm is provided with its own tramway leading from the fields to the railroad, the cars being drawn by mules. Notice is given to the grower to deliver a specified quantity of fruit alongside the cars on a given date, for shipment by a certain vessel, and within 12 to 18 hours after the fruit is cut it has been transported to Port Limón and loaded aboard ship ready for sea.

At the wharf the fruit is transferred from car to ship, at the rate of 2,000 bunches per hour, by mechanical loaders, specially designed to carry it without bruising, over canvas rollers and into the ship's hold. Upon arriving at its overseas destination the fruit is unloaded in the same manner, and within a few hours after the steamer has docked its cargo has been placed aboard special trains of refrigerator cars, waiting to carry it to interior points of distribution.

Thus the bunch of bananas hanging at the corner grocer's, in the small town of the middle West, or New England, has been, in most cases, less than 15 days out of its native habitat in the tropics.

The labor employed in all departments of the banana industry of Costa Rica, as in most banana-producing countries of America, is the Jamaican negro. He not only shows an almost total disregard of the dangerous climatic conditions, but he is experienced in the work, which he learned in his Jamaican home. Indeed, it may almost be said that the existence of the industry—on its present magnitudinous scale at least—is dependent upon the ability of the black man to work year after year in an environment that all too frequently is fatal to the white man and from which, to preserve his life and health, he is compelled to remove himself at frequent intervals.

The annual rainfall in the banana districts is enormous, but the Jamaican continues his labors alike through torrential downpour and the sweltering heat of a tropical sun, rarely falling a victim to the deadly fevers to which the white man so readily succumbs.

The United Fruit Company alone employs upwards of 5,000 negroes in its Costa Rican division. The various purposes for which they are used include clearing and preparing new lands for cultivation, replanting, plowing, pruning, draining, and cutting and loading fruit. The three districts of Zent, Santa Clara, and Banana River are divided into farms, each of which has its white overseer, or *mandador*. Oxen are largely used for plowing and other work in the banana fields, as they are for nearly all hauling in Costa Rica, both in town and country.

The banana plant grows easily and has few enemies. One, however, which of late is giving the growers some concern, is called the *taltuza*, a small, dark-brown rodent, with protruding teeth, closely resembling the American gopher. Like the gopher, it burrows its way under the ground and attacks the roots of the banana, causing the plant to wither and die. This little animal has now almost entirely abandoned its former home in the woods for the banana fields, and no means has as yet been found to exterminate it. The United Fruit Company has gone so far as to bring scientists from the United States and Europe in an endeavor to devise a means of ridding the districts of this pest. Experiments were made by inoculating a number of the animals with disease germs and turning them loose, but little result was noted. The growers offer the laborers one dollar gold per head for trapping them, and in this way their increase is checked to some extent.

Wind-storms are another menace to the plant, to which it falls an easy prey, owing to its large foliage and the weight of the fruit at its top. The danger from this source is minimized by planting the trees in rows diagonal to the direction from which the heavy winds usually blow. Excessive rainfall also is harmful, and considerable outlays have to be made for draining the surplus water from the roots of the plants. Rich as the soil is, it shows a tendency towards deterioration after a few years, necessitating a rest by plowing and letting the land lie idle a season. Commercial fertilizers are little used in the country, but experiments are being made by planting cow-peas where enrichment of the soil is needed.

The banana was long considered an inferior article of food, fit for consumption only by the yellow and black races of Asia and Africa, and it was not until Baron Humboldt, following his voyages to New Spain, called attention to the richness in alimentary sustenance of the fruit and the enormous quantities of it produced on small areas that its importance became generally known.

Of the many forms in which the plantain is served in the hotels and homes of Costa Rica, the baked and fried dishes are more agreeable to the taste. A well-flavored green plantain, sprinkled with sugar and baked in the oven until brown, when the syrup of the fruit issues forth, makes an appeal that is not easy to resist if you are fond of sweets. Sliced lengthwise and fried they are hardly less palatable, and in this style they are frequently served with beefsteak. The various soups of which they form the base may also be recommended, but the boiled plantain, which is a universal food among all classes wherever the fruit is found, does not meet with the same high favor with most foreigners. An excellent dessert, somewhat in the form of a preserve, is made by taking the baked plantain, as above, and cutting it into three or four pieces, adding more sugar and stewing.

A nutritious and easily digestible flour is obtained from the banana after it has been dried in the sun. This flour is said to act as a cure for indigestion and other stomach disorders, and is highly valued by the native women as an infant food. Equal parts of this flour and wheat flour are used in making a bread that is of pleasing taste and nutritious, but worthy of mention more for its digestibility. Artificial heat is also employed in drying the banana to make this flour, and in some countries, notably Jamaica, the industry is of growing importance.

Besides eating the fruit, the inhabitants of the countries where it is grown employ it in a wide variety of ways to supply many of the needs of life. From one species an acceptable quality of vinegar is made simply by mashing the fruit and placing the mash in an earthenware jar covered with a linen rag, allowing it to ferment. The ripe plantain, fermented, gives on distillation an extremely strong brandy, not very agreeable to the taste, and the natives, although accustomed to strong liquors, usually give preference to milder beverages. With the essence extracted from the guineo plantain, a short, thick variety, an aroma, or bouquet, is given to false cognacs and brandies in Europe which are destined for exportation. For coughs and bronchial inflammation a pectoral is made by roasting an unpeeled banana in the oven, removing the skin, then thoroughly cooking it in a little water, taking the syrup. From the ribs of the leaf, which differ in color according to species, the Filipinos weave a remarkably fine cloth, but the most useful service which the leaf renders to the negroes of the banana fields of Costa Rica thus far is protection from the heavy rains, and for this purpose it is better than the finest silk umbrella.

Remarkable as the development of the banana industry has been since the first bunches were shipped, only three or four decades ago, it may be said to hold fully as great promise for the future. The markets where the fruit is already known are insatiable, and practically unopened fields for it are found in the countries of continental Europe. In England its consumption is increasing at a phenomenal pace, as the sterling qualities of the fruit become known and the price cheapened. Where but a few years ago the fruit was obtainable only in the larger cities of that country and each banana was wrapped in tissue paper, commanding a price that only the few could afford to pay, today there is hardly a green-grocer at a country cross-roads who does not sell it.

In July, 1910, the Costa Rican government placed an export duty of one cent gold on every bunch of fruit leaving the country, effective until July, 1930, which is the first direct revenue it has derived from the country's most important industry. This law is universally regarded as just; in fact, its effect has been to stimulate the growing of the fruit, since it gives assurance that the duty will be no higher during that period.

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NOTES ABOUT ANTS AND THEIR RESEMBLANCE TO MAN

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Dr. Wheeler is the author of an unusually entertaining book, "Ants, Their Structure, Development, and Behavior," published by the Columbia University Press. The volume contains 650 pages and several hundred illustrations, and is probably the most scholarly and suggestive work on the subject that has been published. The pictures illustrating this article are from the above book.

IT IS sometimes profitable to turn away from the consideration of the social and economic problems, which so constantly beset us, to a study of the social insects and their methods of solving the problems which they, too, have had to face during their long and strenuous evolution.

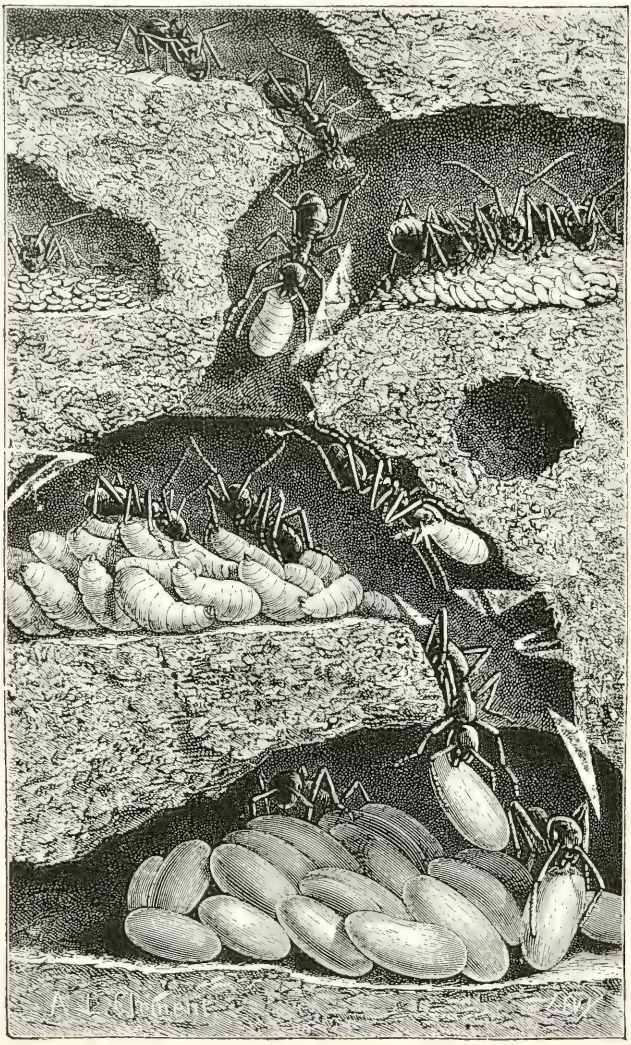
Though in most respects man and the insect differ enormously, both nevertheless display some remarkable convergent similarities. They are the only two successful and dominant animal types of the present age, and, so far as they are social, not only have had to encounter the same obstacles, but have learned to overcome many of them in the same manner.

The social insects, however, have been more successful than man in organizing stable communities, because they have frankly trusted and followed their instincts and have therefore carried their social organization to its logical, or perhaps we had better say instinctive, conclusion, whereas man's intellectual processes and the ideals and dissentions to which they give birth forever prevent a definitive solution of economic problems and keep him in a state of active and ceaseless evolution.

We naturally find, therefore, that the stable and well-regulated insect societies, which have "neither guide, overseer, nor ruler," have always aroused the admiration of those who long for a rigid communistic control of human society, while the individualist turns away from them with a feeling akin to horror.

THREE GREAT PROBLEMS OF EXISTENCE

It is well known that three great problems must be solved by every organism that would survive in the struggle for existence; first, how to obtain a sufficient quantity of the right kind of food; second, how to reproduce its kind and bring up its offspring, and, third, how to protect itself and its offspring from the injurious effects of both the lifeless and the living environment. And although all animals are constantly impelled to the solution of these problems by the primal instincts of hunger, love, and fear, the solution is often extremely difficult. And it is especially difficult in the social and colonial animals, because these must en-



INTERIOR OF AN ANT NEST OR FORMICARY (AFTER ERNEST ANDRÉ)

Showing the arrangement of the chambers and galleries and the ants' method of classifying the brood according to stages. The lowermost chamber contains only cocoons (pupæ), the next above mature larvæ, while the young larvæ and eggs are in the superficial chambers.

ter into severe competition not only with other organisms, but also with the members of their own species, to whom they are, moreover, bound by indissoluble ties.

There are two main groups of social insects, the termites and the social Hymenoptera, the latter embracing three minor groups, the social wasps, the social bees, and the ants. It is more than probable that social habits were developed independently in all four of these groups, and that such resemblances as they exhibit are due more to what biologists call convergence than to blood relationship.

Ants are to be found everywhere, from the arctic regions to the tropics, from timberline on the loftiest mountains to the shifting sands of the dunes and seashores, and from the dampest forests to the driest deserts. Not only do they outnumber in individuals all other terrestrial animals, but their colonies even in very circumscribed localities often defy enumeration. Their colonies are, moreover, remarkably stable, sometimes outlasting a generation of men. Such stability is, of course, due to the longevity of the individual ants, since worker ants are known to live from four to seven and queens from 13 to 15 years. In all these respects the other social insects are decidedly inferior.

A GREAT PRODUCER OF SPECIES

Not only are the colonies of the wasps and bumblebees of rather rare occurrence, but they are merely annual growths. The honey-bees, too, are very short-lived, the workers living only a few weeks or months, the queens but a few years. The termites, though perhaps longer-lived than the bees and wasps, are practically confined to very definite localities in the tropics. Only a few of the species have been able to extend their range into temperate regions.

Thus unquestionably the most successful and dominant of all these groups is the ants, for these have produced the greatest number of species, have occupied all parts of the earth, except the very tops of the high mountains and the cold arctic and antarctic regions, with untold multitudes of individuals, and have developed the most intimate and complicated rela-

tionships to other insects and the vegetation of the planet. It is therefore particularly instructive to study the methods whereby the ants as social insects have solved the problems of nutrition, reproduction, and protection.

The ant colony or society may be regarded as an organism which, like the individual insects of which it consists, grows and develops to a fixed adult size, and the size to which it grows is characteristic of the species, just as is the size of any individual. Some ants always form diminutive colonies of only a few dozen individuals, whereas the colonies of other species, when mature, may comprise thousands or hundreds of thousands. The growth of these colonies obviously depends on the quantity and quality of the available food supply and on its distribution for immediate consumption, or its storage for the future use of the colony.

THE INTRICATE PROCESS OF FOOD CONSERVATION

Ants feed on a great variety of substances, but in all cases only the liquid portions of the food are taken into the alimentary tract. If the food is solid, minute particles of it are rasped off by means of the tongue and pressed into a small pocket in the floor of the mouth. The juices expressed from the mass are then sucked back through the gullet into a dilated portion of the alimentary tract, the crop, and the useless pellet is spit out.

The crop is very distensible, but thin-walled and lined with a layer of chitin, which is impenetrable to the liquid contents, so that none of the food, so long as it is stored in this receptacle, can be absorbed or digested. The crop is closed behind by a complicated valve, which separates it from a short, bag-like stomach, the walls of which have a permeable lining, so that it and the succeeding portions of the alimentary tract, the intestine, are able to digest and absorb any food which may be permitted to enter them through the valve.

The crop and true stomach have been called respectively the "social" and "individual" stomachs, because the liquid food stored in the former is in great part distributed by regurgitation to other ants,

Photo by Mr. J. G. Hubbard and Dr. O. S. Strong

QUEENS OF A COMMON ANT (*Camponotus americanus*)

One of the queens is fecundated and has lost her wings and is thus prepared to start a colony. Ant societies are societies of females. The males really take no part in the colonial activities, and, in most species, are present in the nest only for the brief period requisite to insure the impregnation of the young queens. The males take no part in building, provisioning, or guarding the nest, or in feeding the workers or the brood. They are in every sense the *sexus sequior*. Hence the ants resemble certain mythical human societies like the Amazons, but, unlike these, all their activities center in the multiplication and care of the coming generations.

whenever they signify their hunger by protruding their tongues and making supplicatory gestures with their feelers, and because none of the food in this receptacle can be used by the individual unless it passes back through the valve into the true stomach.

The crop is thus a storage reservoir from which both the individual and the colony can be supplied with nutriment. Other older and cruder methods of the distribution and storage of food coexist among ants with this more modern and more efficient method.

Thus solid foods may be carried into the nest entire and then dismembered and the pieces distributed to different parts of the nest to be still further comminuted and sucked dry by groups of ants, or the solid food may be carefully stored in special chambers.

Photo by Mr. J. G. Hubbard and Dr. O. S. Strong

PORTION OF A *Camponotus americanus* COLONY WITH WORKERS AND VIRGIN QUEENS

Five pairs of workers are seen in the act of feeding one another by regurgitating liquid food from the social stomach or crop. Many observers, especially McCook, have dwelt on the exquisite care bestowed by ants on their own bodies and those of their comrades. Much of the time spent by these insects in the dark recesses of their nests is devoted to cleansing the surfaces of their bodies with their tongues and strigils. This process is not only necessary for removing all particles of the earth in which the ants work so much of their lives, but it also invests their bodies with a coating of slightly oleaginous saliva, which probably protects them from moisture and may be sufficiently antiseptic to prevent the growth of lethal moulds and bacteria.

A DETERMINED ATTEMPT AT SELF CIVILIZATION

As ants were primitively carnivorous or predacious insects, it is rather difficult to understand how they could have developed societies at all, for as a general rule we find that predacious animals, which have to hunt their prey or to lie in wait for it, like the spiders, hawks, and tigers, live solitary lives, and that only vegetarians like the caterpillars, sparrows, rodents, and ruminants, which have easy access to a large amount of food, develop gregarious or social habits.

There can be no doubt that the ants have found it difficult to reconcile their carnivorous appetites with their social proclivities, for we find that they have attempted this reconciliation in diverse ways.

Most of the species of the oldest, most primitive, and most conservative subfamily, the Ponerinæ, have not been able to relinquish their carnivorous habits, and have therefore been prevented from forming large colonies. Most of the species of this subfamily, in fact, form colonies of only a few dozen individuals, and these colonies are, moreover, rare and depauperate in appearance.

Photo by Mr. J. G. Hubbard and Dr. O. S. Strong

PORTION OF A COLONY OF *Camponotus americanus* AT THE HEIGHT OF THE BREEDING SEASON

a, egg; *b*, young larvæ; *c*, older larvæ; *d*, worker cocoons; *e*, queen cocoon; *f*, worker major pupa removed from cocoon; *g*, worker media, in the act of hatching; *h*, major workers; *i*, minor workers; *k*, virgin female, or queen; *l*, males. Magnification about two diameters.

Another subfamily, the Dorylinæ, embracing the wonderful driver ants of Africa and the legionary ants of the American tropics, are also highly carnivorous, but nevertheless succeed in forming immense colonies, often of hundreds of thousands of individuals. This they accomplish by relinquishing the sedentary habits so characteristic of the great majority of ants. They keep moving in long files through the jungles, capturing or killing all the insects they encounter, and even overrunning dwellings, and, in their search for cockroaches and other vermin, driving out the human inhabitants. From time to time these strange ants bivouac for the night or for a few days in some hole in the ground, or under a tree, but soon continue their predatory march. Evidently they are able to remain carnivorous, and at the same time to develop large colonies, only because they are nomadic and can thus draw their food supply from a large area.

The Ponerinæ and Dorylinæ ants have thus adopted the only modes of life which will permit a union of predatism and sociability.

Their colonies must either remain small and rare, or, if populous, must keep moving from place to place. As each of these conditions has serious disadvantages, we find that the majority of ants have preferred to become more and more vegetarian, though, like man, usually without completely abandoning their carnivorous appetites.

A FAVORITE FOOD

One of the earliest departures from an exclusively animal diet is seen among the ants which attend plant-lice, scale insects, and leaf-hoppers and feed on their saccharine excrement. This excrement is, of course, merely plant sap slightly altered in its chemical constitution by passing through the digestive tract of the insects, and containing much water, some sugar, and a little nitrogenous matter.

Many ants are so inordinately fond of this food that they not only acquire an intimate acquaintance with the habits of the adult plant-lice and scale insects, but actually collect and store their eggs in the nests during winter in order that they may during the ensuing spring distribute the hatching young over the roots or foliage of the plants. This is a well-developed habit among the species of *Lasius* throughout temperate North America and Eurasia (see pictures, pages 743, 744).

Other plant juices, such as the nectar of flowers and the similar liquid secreted by the glands on the petioles of leaves and by green galls, are also assiduously collected by ants. There is, moreover, a singular tendency for some ants which are engaged in this collection of nectar and plant-lice excrement to become "honey-ants" through an extraordinary exaggeration of the instinct to store liquid food in the crop or social stomach.

LIVING STOREHOUSES FOR FOOD

Certain individuals, the "repletes," of the colony refrain from leaving the nest and foraging for food and become converted into flagons by distending the crop to such enormous dimensions that the abdomen looks like a transparent bead (see pictures, pages 747, 748). In this condition they hang by their claws from the roof of the nest chamber and thenceforth spend all their lives receiving liquid food from the tongues of the foraging ants, storing it in their crops, and regurgitating it to hungry individuals when the liquid food supply outside the nest becomes inadequate. This is, of course, apt to be the case periodically in dry regions, so that we find the true honey-ants only in deserts like those of the southwestern states, northern Mexico, South Africa, and central Australia.

In such localities also a further adaptation to vegetarianism may be frequently observed in many species of ants which take to harvesting and eating the seeds of the small herbaceous plants. This harvesting habit is evidently a last resort in regions where insect food is very scarce or confined to a brief season.

There are several dozen species of harvesting ants in North America alone, the most conspicuous being those of the genus *Pogonomyrmex*, the species of which range all the way from Montana to the Argentine through the dry western portions of two continents. It was for-

Photo by the Author

MAJOR AND MINOR WORKERS OF *Camponotus americanus*

The worker is produced by inadequate nourishment; is "a hunger form." Magnification about two diameters (see text, page 742)

merly supposed that these ants intentionally sowed seeds in the ground in order that they might later harvest the crop, but this supposition has been shown to be erroneous. The ants merely visit the plants, which are often at some distance from the nest, and carry the seeds home over well-beaten paths.

FARMER ANTS

That ants can carry on agricultural or horticultural pursuits has, however, been proved by a study of the peculiar Attii, a tribe comprising more than a hundred species, all confined to America and nearly all to the tropics. These ants live on fungi which they cultivate on beds of triturated leaves, or insect excrement in specially excavated chambers.

The large species of the genus *Atta* cut pieces of leaves from trees, carry them into the nest in great numbers, cut them into smaller fragments, and build them up on the floors of the chambers into sponge-like masses, over the surface of which a delicate white fungus rapidly proliferates. This fungus, which is constantly weeded by the smallest ants in the colony, is prevented from fruiting and constrained to produce peculiar clus-

Photo by Mr. J. C. Hubbard and Dr. O. S. Strong

PORTION OF COLONY OF *Camponotus americanus*

The large, winged individual is a virgin queen; the two smaller ones are males; the large-headed wingless individuals are major, the small-headed ones minor workers. A major worker, in the left-hand upper corner, is carrying a half-grown larva in its mandibles. Eggs, very young larvæ, cocoons, and one pupa removed from its cocoon are also shown. Magnification about two diameters.

Photo by Mr. J. G. Hubbard and Dr. O. S. Strong

PORTION OF COLONY OF *Camponotus americanus*

Four virgin queens and numerous workers. In the upper left-hand corner one of the workers is seen in the act of receiving food from another by regurgitation. Magnification about two diameters

Photo by the Author

ADULT WORKER LARVÆ, SEMI-PUPÆ, AND NUDE AND COVERED PUPÆ IN VARIOUS STAGES OF PIGMENTATION OF *Formica subsericea*

Magnification two diameters

ters of small, glistening food-bodies called "ambrosia" (see pictures, pages 750-754).

Some of the small Attii, instead of building their fungus-gardens on the floors, suspend them from the ceiling of the chambers, so that the masses of substratum clothed with fungus filaments hang down like white velvet curtains. This habit is beautifully developed in several species of *Trachymyrmex* and *Mycetosoritis*. One of these, *Trachymyrmex septentrionalis*, ranges as far north as the pine-barrens of New Jersey.

None of the Attii or their larvæ, so far as known, can eat anything except the particular kind of fungus which they cultivate. To appreciate the advantages to which these completely vegetarian ants have attained in thus substituting an easily controllable and abundant food-supply for the scarce and precarious insect diet of their predatory ancestors, one must observe these wonderful ants in Brazil or Central America, moving over their long trails in interminable processions, defoliating whole trees and carrying their leafy burdens like banners to their huge nest craters, which often spread over a quarter of an acre or more.

The foregoing remarks show that the ethnic history of ants parallels that of man to the extent that these insects were originally flesh-eating hunters, then shepherds of food-producing herds, and finally agriculturists, and that they have been compelled to pass through these stages or forfeit the advantages of living in populous and stationary communities. It is evident, furthermore, that the social needs of ants, like those of man, have been even more exigent than hunger.

SOCIAL DIETITIANS

The skill and success with which the higher ants have thus adapted their diet to the requirements of sociability contrasts markedly with the conditions in the other social insects. The social wasps are carnivorous, to be sure, but their colonies are small and rare like those of the Ponerinæ, and in temperate regions merely annual growths. The social bees have retained the exclusively vegetarian diet of their solitary ancestors, but, as they have greatly specialized by restricting this diet to nectar and pollen, they have become dangerously dependent on the evanescent flowers. And though they have learned to construct a wonderful system of cells for food storage, they are quite unable to control the food supply. Finally, the termites, though completely vegetarian, have also become too specialized by restricting their diet to wood, or cellulose, a hard and innutritious substance, which, though abundant, can be assimilated only with great difficulty.

It is significant, therefore, that the termites of Africa and the Indomalayan region, which form the largest and most aggressive colonies, have become fungus-growers. But even these have not yet learned, like the Attiine ants, to grow "ambrosia" for all the members of the colony. The working population of the nests still has to live on wood in order to produce the excrement which is used in the construction of the gardens. The fungus itself is fed only to the young and to the sexual individuals.

It is a biological axiom that all organisms tend to propagate so rapidly that they are continually in danger of outrunning their food supply. This danger is even greater in the social or colonial than in the solitary organism, because the former is necessarily much hampered in its movements, and if every individual of which the colony consists be permitted to reproduce the food supply would very soon become so inadequate as seriously to impair the functions of the community as a whole. Hence it is not surprising that all social or colonial organisms are bound to restrict the reproductive function of their component individuals. This is true even of the individual organism itself regarded as a colony of cells.

REGULATING THE GROWTH OF FAMILIES

The four groups of social insects have, therefore, had to face a very difficult problem, and it is interesting to note that they have solved it in essentially the same manner as other social aggregates, the cell-aggregate, or individual organism included, namely, by restricting the reproductive function to a very few of the component individuals and by reducing

Photo by the Author

NEST OF A VERY COMMON ANT: *Lasius (Acanthomyops) latipes*

Only the irregular superficial galleries and chambers are shown as they appear when the stone covering the nest is removed. The care of the nest is an important matter with all ants, for convenience, no less than sanitation, requires that the galleries and chambers be kept scrupulously clean. All species, therefore, remove any refuse food, empty cocoons, pupal exuviæ, meconial pellets, dead members of the colony, etc., to a proper distance from the living apartments. Veritable kitchen middens are established for this purpose, either in the open air or, if the colony is nesting under a large stone, in one of the deserted surface galleries.

the great majority to sterility and endowing them with a purely nutritive or protective function.

Nevertheless there are some interesting minor differences in the solutions of the problem of reproduction as exhibited by the termites on the one hand and the social Hymenoptera on the other. Although both of these groups bring up their brood in such a manner that the majority of individuals in the colony are sterile and only a few normally capable of reproduction, the termites make sterile or worker forms out of both male and female individuals, whereas the wasps, bees, and ants produce sterile forms only among the females and merely reduce the number of males and permit them to develop only at certain seasons.

Hence among the social Hymenoptera we have three castes: males, fertile females, or queens and sterile females, or workers. The workers among ants and termites, however, may be still further differentiated into workers proper and soldiers, the former having a nutritive, the latter a protective, function.

This remarkable method of reducing the reproductivity of a society, whilst insuring its nutritive success, is of no little interest at the present time. It is probably not a mere coincidence that we

Photo by Mr. J. G. Hubbard and Dr. O. S. Strong

WORKERS AND COCOONS OF THE ANT WHICH PASTURES AND GUARDS PLANT-LICE: *Lasius (Acanthomyops) claviger* (SEE TEXT, PAGES 735, 736)

This is a common herder of root-lice in the northern States. From the small cocoons males and workers will hatch; from the two large ones queens. The pale individuals at *a* are just-hatched callows. Magnification about two diameters.

should be most diligently discussing eugenics, or the restriction of reproduction to the sane in mind and body, at a time when we are also most exercised by the high cost of living. Did space permit, it could be shown that man, like other social organisms, has for ages sought and is still seeking means of regulating the reproductivity of his race to prevent its exceeding its food supply, and that the expedients on which he has relied in the past, such as monasticism, wars, and the adoption of religious, property, and caste restrictions to marriage, have been only partially successful.

In termites, both sexes, as we have seen, coöperate equally in the activities of the colony, so that each nest contains, besides a king and queen, a host of workers and soldiers of both sexes. The colonies of ants and the other social Hymenoptera, however, are essentially feminine, since they contain one or more queens and a great number of workers, which are all sterile females, and only at certain times of the year contain any males. These, moreover, take no part in the colonial activities, but live only to mate with the queens of other colonies during the annual marriage flight.

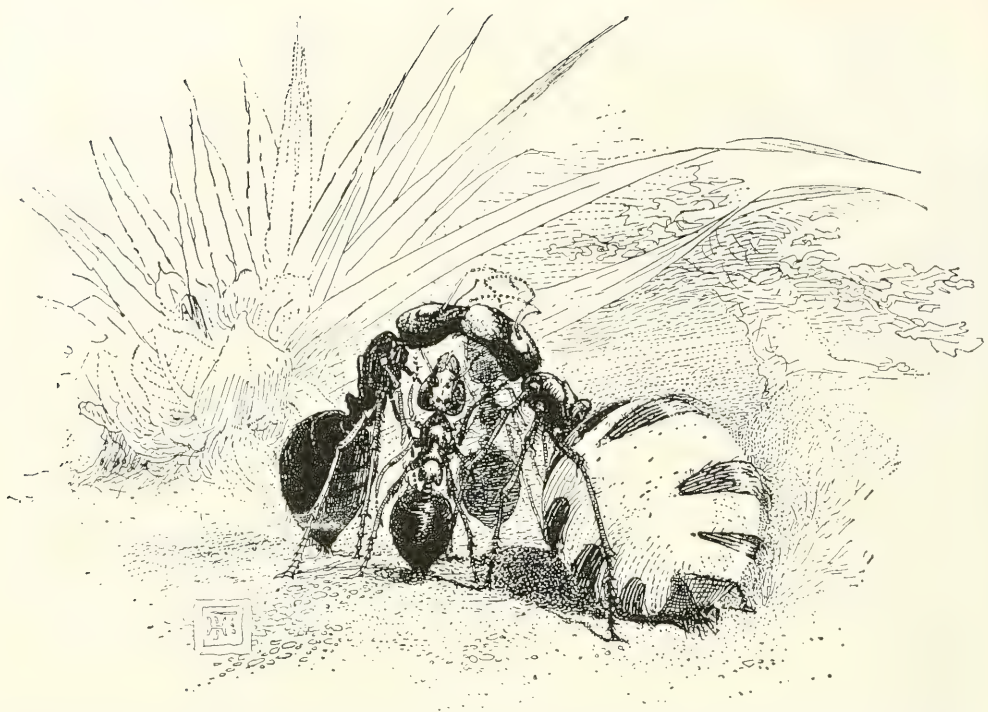
We are therefore prepared to find that maternity is the pivotal instinct about which all the activities of the ant colony revolve. Not only the queen, the repro-

A COLONY OF THE ANT WHICH HOARDS THE EGGS OF THE CORN-ROOT LOUSE IN ITS NESTS OVER WINTER AND DISTRIBUTES THE JUST-HATCHED YOUNG IN THE SPRING ALONG THE ROOTS OF THE MAIZE

Photo by Mr. J. G. Hubbard and Dr. O. S. Strong

COLONY OF *Lasius* (*Acanthomyops*) *claviger*, A COMMON SUBTERRANEAN ANT IN THE WOODS OF THE EASTERN STATES, WHICH NURSES THE ROOT LICE

Two mother queens, without wings, several winged or virgin queens, and males are scattered through the throng of workers. Three queen cocoons and numerous worker cocoons are also shown. Magnification about two diameters (see pages 735, 736).



THE HONEY ANT, WHOSE STOMACH IS DEVELOPED INTO A FOOD RESERVOIR FOR THE REST OF THE ANT COLONY

The picture shows the honey ant (*Myrmecocystus hortideorum*) in the act of regurgitating food to workers of the ordinary form. (After H. McCook.) (See text, page 736.)

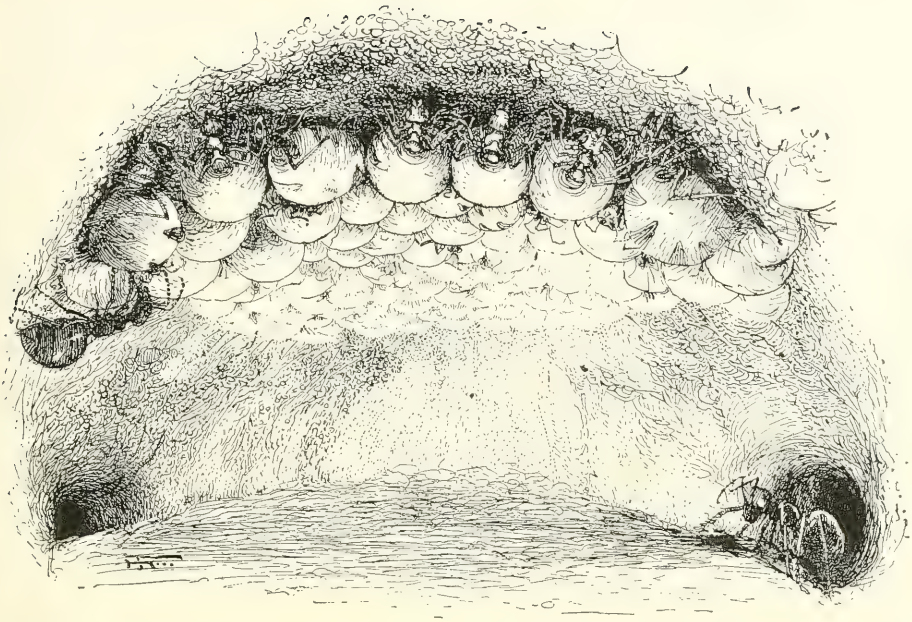
ductive center of the colony, but all the workers act as though they were obsessed with a perfect mania of reproduction and nursing. Unless this fact is clearly appreciated, much of the behavior of ants will remain enigmatic, meaningless, or absurd.

Nothing shows more clearly the strength of the maternal instincts in ants than the development of the colony from its inception till it becomes in turn the mother of other colonies. After mating with the male high in the air, the queen descends to earth and loses her wings, either by breaking them off at the base against the stones or blades of grass or by tearing them away with her mandibles, for they are to be of no further use to her. She then seeks some small cavity under a stone or piece of bark, or digs one in the ground, and closes it after her, so that she is completely shut off from the world (see picture, page 763).

In this little cell she passes days, weeks, or even months without food while waiting for the eggs in her ovaries to mature. The now useless wing-muscles, which fill her large thorax, dissolve in the blood and go to build up the yolk of the eggs, and a similar fate overtakes the great masses of fat which she stored away in her abdomen during her larval life in the maternal nest.

THE INFANT OFFSPRING FEED THE STARVING MOTHER

Eventually she lays a small batch of eggs and cares for them till they hatch as helpless grub-like larvæ. These she feeds with her saliva, but as the supply of this is meager, the larvæ grow slowly, pupate prematurely, and emerge as very small and feeble workers. They nevertheless at once set to work to expand the colony by opening up a gallery to the outside world and go forth to forage. They bring in food to their starving mother and henceforth spend their days in foraging, enlarging the nest by excavating additional galleries and chambers, and in



The "replete" workers, with their social stomachs distended with the sweet exudations of oak galls, hang from the vaulted roof of the chamber in a cluster and function as so many food reservoirs. (After H. McCook.) (See text, page 736).

rearing the successive broods of larvæ from the eggs which the queen is now able to produce in quantities.

The larvæ are fed more abundantly as the number of workers increases, and therefore develop into larger and more vigorous individuals. As time goes on and at the proper season, male larvæ appear and develop, and the female larvæ are so well fed that they can develop beyond the worker stage and become queens.

With the appearance of these sexual forms the colony has reached maturity, and although it may persist for many years, it merely repeats each year this same cycle of feeding and rearing as great a number of individuals as possible on the amount of food which the workers can secure.

The queen may live a dozen years or more, and each worker may live three to four years, but the males usually live only a few weeks and die after the nuptial flight, being exhausted and knowing neither how to feed themselves nor how to return to the nest.

THE HIGHEST DEGREE OF SELF-SACRIFICE

Most extraordinary during the development of the ant colony is the behavior of the workers, for though sterile and, under ordinary circumstances, unable to lay eggs, they nevertheless exhibit all the other maternal instincts in an exaggerated degree. The worker, as we have seen, is a form produced by inadequate nourishment. It is a hunger form, so inured to long fasting during its larval life that even when it reaches maturity it seems to prefer to starve, for though greedy to fill its social stomach with liquid food whenever there is an opportunity, it dispenses this store most generously to the larvæ and its sister ants and permits very little of it to pass the valve into the individual stomach, only enough, in fact, to maintain healthful activity.

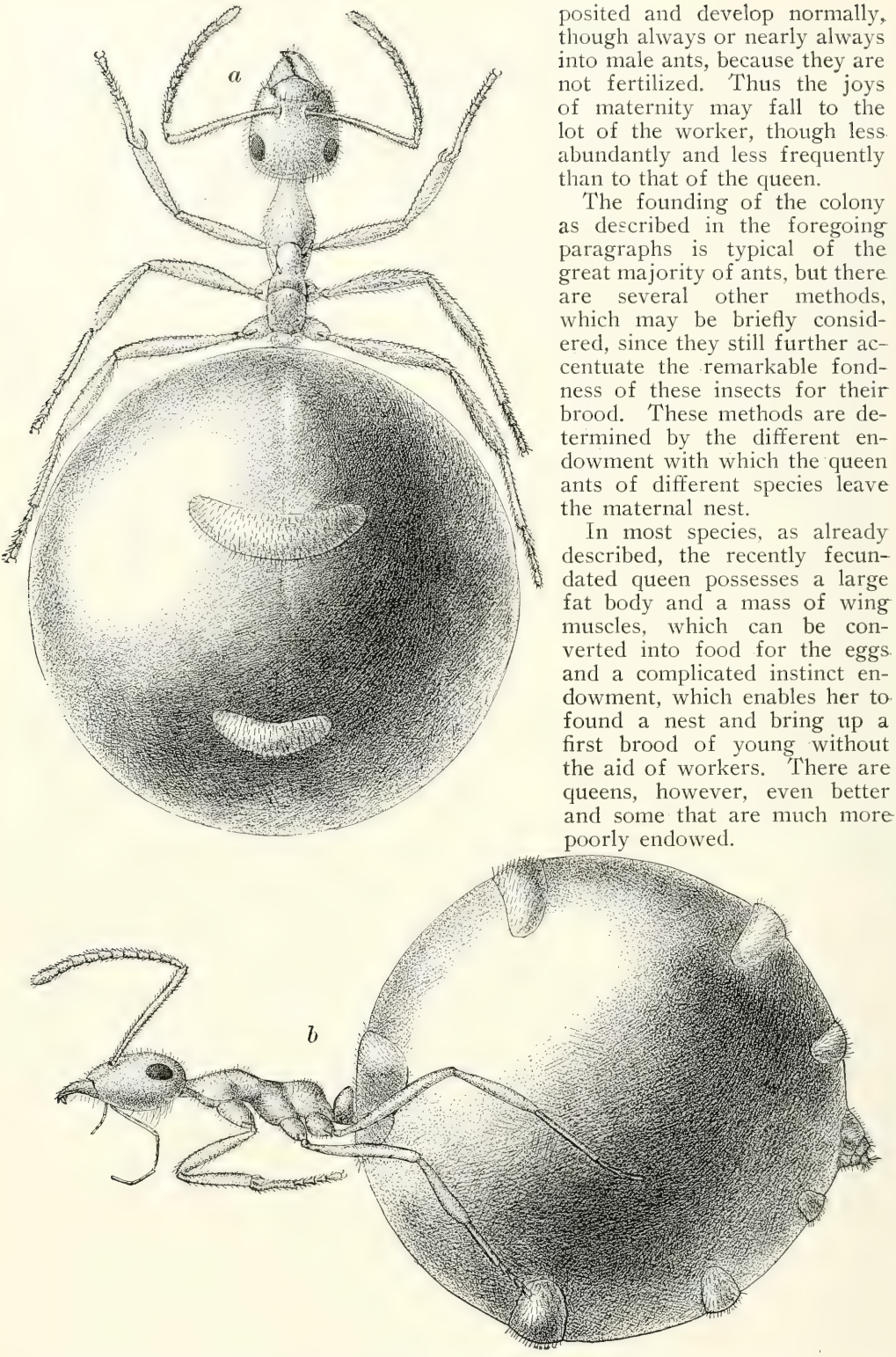
Ants are, therefore, the most thoroughgoing of communists, to whom individual possession as such has no meaning beyond its benefit to the community as a whole.

But even the worker's sterility, which has given certain individualistic thinkers such bad dreams, is neither fixed nor irrevocable. If the colony has a very abundant food supply, or if its queen dies, the small, undeveloped eggs, which are always present in the ovaries of the workers, may grow to full size, be de-

posited and develop normally, though always or nearly always into male ants, because they are not fertilized. Thus the joys of maternity may fall to the lot of the worker, though less abundantly and less frequently than to that of the queen.

The founding of the colony as described in the foregoing paragraphs is typical of the great majority of ants, but there are several other methods, which may be briefly considered, since they still further accentuate the remarkable fondness of these insects for their brood. These methods are determined by the different endowment with which the queen ants of different species leave the maternal nest.

In most species, as already described, the recently fecundated queen possesses a large fat body and a mass of wing muscles, which can be converted into food for the eggs and a complicated instinct endowment, which enables her to found a nest and bring up a first brood of young without the aid of workers. There are queens, however, even better and some that are much more poorly endowed.



THE FAMILY STOMACH OR REPLETES OF THE HONEY ANT OF THE GARDEN OF THE GODS (*Myrmecocystus hortideorum*)

a shows the insects as seen from above; *b* in profile. In both the segments of the abdomen are widely separated by the thin intersegmental membrane, which is greatly stretched by the distended crop, or social stomach. (Author's illustration.) (See text, page 736.)

BORN WITH A WELL-STOCKED LARDER

To the former class belongs the queen of the fungus-growing ants, which not only leaves the maternal nest with the mental and bodily endowment of the ordinary queen, but also inherits some property in the form of a bundle of fungus filaments from the gardens of the maternal nest, tucked away in the little pocket in the floor of her mouth. After she has excavated her chamber in the soil and closed its entrance, she is thus in a position not only to bring up a first brood without extraneous aid, but to start the gardens with the fungus pellet, which she spits out, and keeps growing by careful weeding and by manuring it from time to time with her excrement, or even with her own broken eggs, till the first-ling workers hatch and begin to bring in the leaf material or caterpillar excrement, which is henceforth used as the only substratum for the gardens.

Very different is the endowment of the queens of a number of parasitic ants. These queens are either very small and feeble or lack the instincts and initiative that would enable them to found a colony independently. They are therefore compelled to seek assistance in this arduous task, and they succeed in securing it in one of the three following ways:

The young queens of some parasitic ants enter the colonies of an allied species, the workers of which then either kill their own queen and adopt the parasite in her stead or permit the latter to kill their queen. After the reproductive center of the host colony has been thus destroyed, the intrusive queen lays her eggs and permits her young to be brought up by the alien workers. These die off in the course of a few years, but by that time they have reared at least one brood of the parasitic species and the colony, now consisting exclusively of the queen and workers of this species, is sufficiently vigorous to lead an independent existence. This method of colony formation, in which the queen is relieved from the difficult task of feeding and rearing a first brood, has been called temporary social parasitism. It is characteristic of many of the largest and most prosperous ants of the north temperate zone—*e. g.*, of the mound-building ant of the Alleghanies (*Formica exsectoides*) and the fallow ant of Europe (*F. rufa*).

THE KIDNAPPERS

A different method is adopted by the slave-making ant *Formica sanguinea* and many of its subspecies (see picture, page 755). The young queen enters a nest of the common black *Formica fusca* or of some one of its many varieties, kills or drives away any of the workers when, irritated by her odor, they rush forth to attack her, then hastily collects a lot of the worker pupæ of the *fusca* and stands guard over and defends them till they hatch. These workers at once affiliate themselves with the queen as intimately as if she were their own mother and bring up her brood for her as soon as it appears.

The *sanguinea* young inherit their mother's peculiar instinct to attack the *fusca* colonies in the neighborhood and to kidnap the worker pupæ. They bring these pupæ back to the maternal nest and eat some of them, but permit others to hatch and become "auxiliaries," or "slaves." Thus what has been called slavery among ants is merely a form of parasitism, in which the "slave" species is really the host. In old colonies the *sanguinea* workers often lose the slave-making habit, and as the *fusca* workers then completely die out, there ensues an emancipation of the *sanguinea* colony from the host like that observed in the temporary social parasites.

THE SLAVERS

A third method is adopted by the young queens of the permanent social parasites. These queens enter the colonies of an alien species and are adopted like the queens of the temporary social parasites, after the enforced death of the host queen, but the worker offspring of the parasite are destined always to live with the host species. There are really two methods of insuring this result. One is by slavery, as in the case of the amazon ants (*Polyergus*), the workers of which are unable to feed themselves, to care for

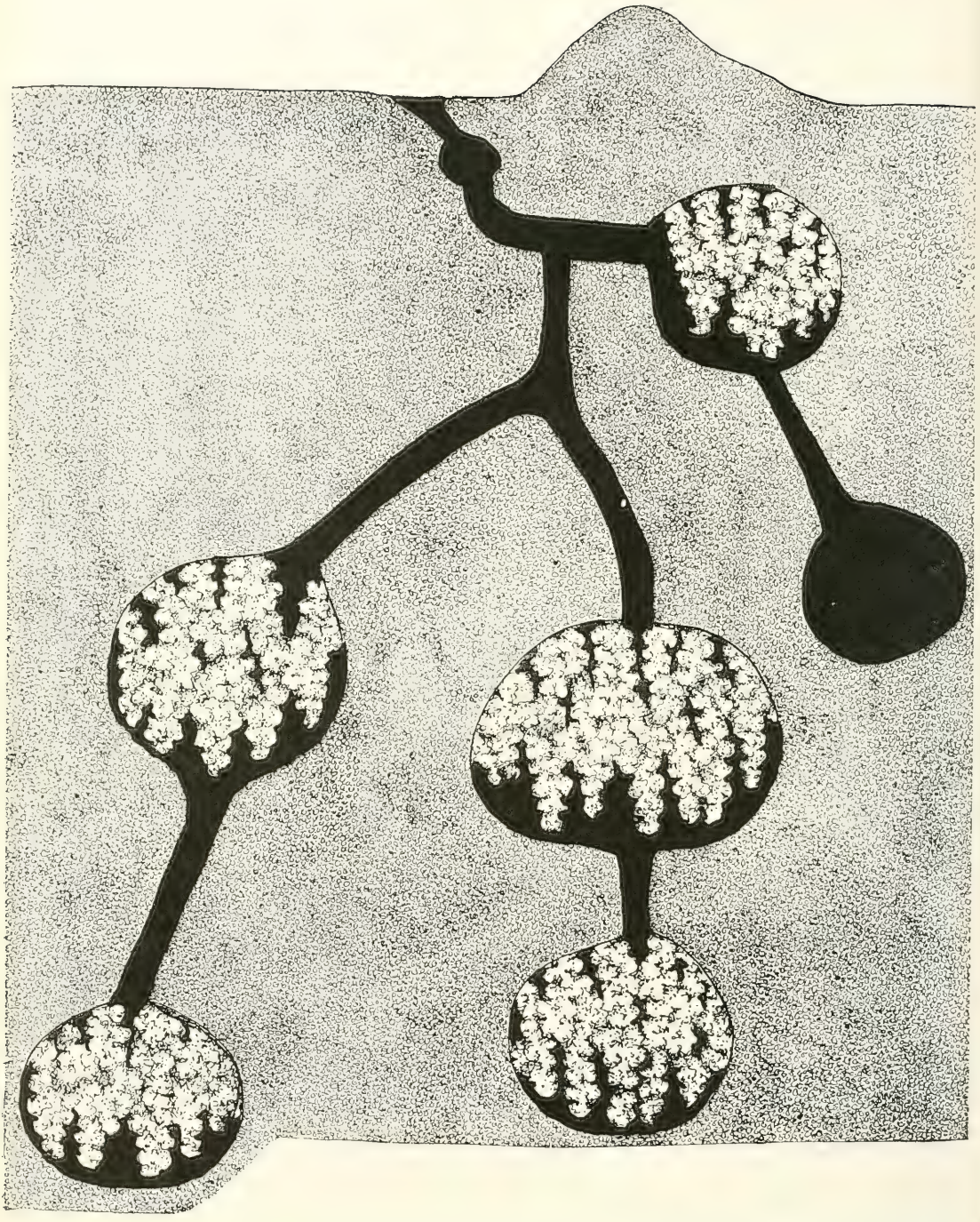
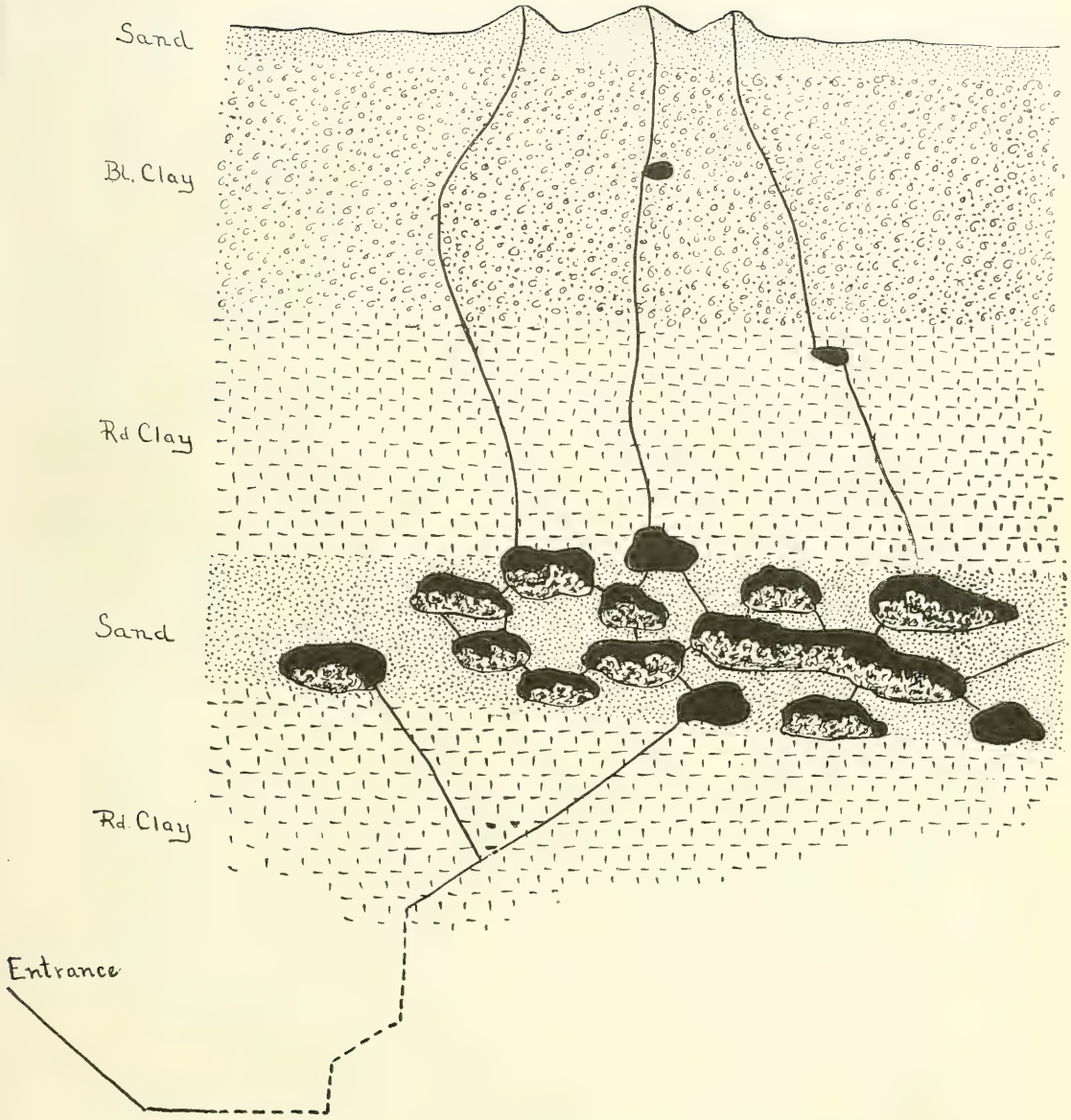


ILLUSTRATION OF THE GARDENS OF A FUNGUS-GROWING ANT (*Trachymyrmex obscurior*) OF THE SOUTHERN STATES

The figure shows near the surface the small original chamber formed by the queen, five chambers, with pendent fungus gardens, and a newly excavated chamber, in which the garden has not yet been started (see text, pages 737 and 738).



From a sketch by Messrs. A. L. Melander and C. T. Brues

NEST DIAGRAM OF THE TEXAN LEAF-CUTTING ANT (*Atta texana*).

The large chambers, with sponge-like fungus gardens on their floors, are situated in a stratum of sand under layers of red and blue clay and several feet below the surface, on which the nest craters have their openings (see text, pages 737 and 738).

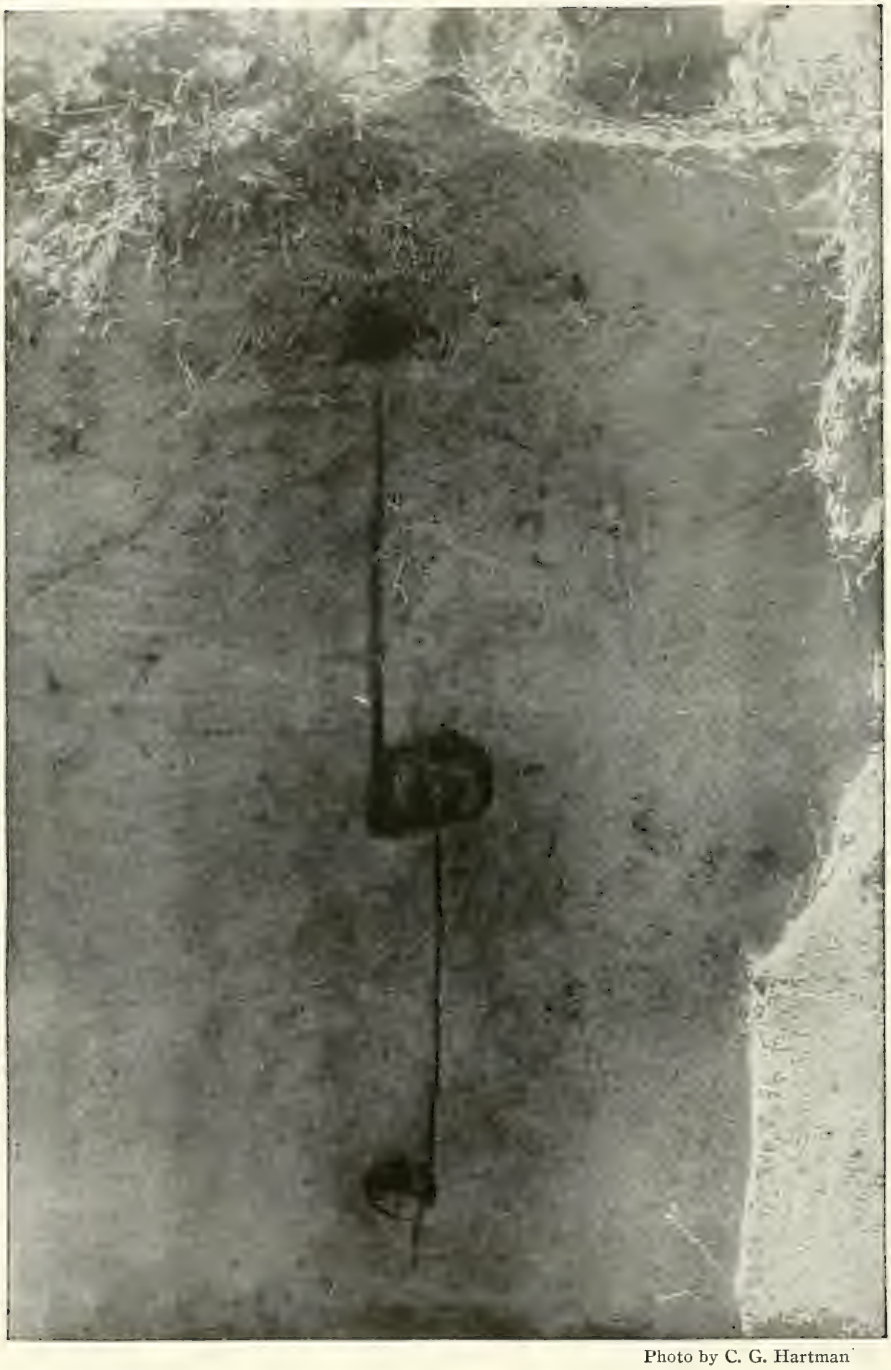


Photo by C. G. Hartman

A PHOTOGRAPH OF A SECTION OF THE NEST OF A SMALL TEXAN FUNGUS-GROWING ANT (*Mycetosoritis hartmani*)

Two of the three chambers of the nest, which is excavated in pure sand, contain pendent fungus-gardens. About one-fourth the natural size

Photo by C. G. Hartman

NEST CHAMBER OF A SMALL TEXAN FUNGUS-GROWING ANT (*Mycetosoritis hartmani*)

The middle chamber of the preceding figure one-fourth larger than natural size, showing in the upper right-hand corner some of the rootlets to which the garden is suspended

their brood, or to excavate the nest, and are therefore compelled to keep kidnapping the young of the host species in order to secure the performance of these tasks. The other method is by completely suppressing the worker caste in the parasitic species, so that the queen after her adoption in the nest of the alien species can at once produce males and females within the host colony's lifetime, which is very short because the host queen has been eliminated.

These various methods of colony formation show that among ants the extreme adaptations of parasitism have for their sole object the securing of better opportunities of reproduction.

The restriction of reproduction to a few members of the colony brought with it, among other advantages, the usurpation of the nutritive and protective functions by a special caste, the workers, which, moreover, comprised the majority of the personnel of the colony. Later these functions were delegated to two subdivisions of this caste, the workers proper and the soldiers.

Among the special adaptations for the protection of the colony we may cite the development of the sting and of the various poisonous or malodorous secretions with which the workers spray or smear the bodies of their enemies, the enlarged mandibles of the soldiers, and above all the excavation or construction of the nest, which protects the colony both from its enemies and from excessive drought, cold, and heat.

Photo by the Author

LARVÆ OF THE TEXAN AGRICULTURAL ANT (*Pogonomyrmex molefaciens*)

The brilliant white color and tensity of the skin in these grub-like creatures is due to the great accumulations of fat, which will be used, in part at least, during pupation in building up the body of the adult ant. Magnification about five diameters.

ANTS THAT BUILD INCUBATORS

Ants no doubt originally nested in the earth, and the majority of species still prefer this habitat. It was while living in this plastic material that they learned to prefer irregular galleries and chambers and to become great opportunists, in marked contrast with the social wasps and bees, which have never been able to depart from their habit of rearing their young in combs made of a refractory substance like paper or of an expensive secretion like wax.

The ants early discovered the great advantages of being able to carry their brood from place to place when danger threatened.

In connection with this free method of dealing with the brood, they were also led to add to the original subterranean nest a kind of tepidarium or incubator, in which the young could be placed during the warmest hours of the day for the purpose of hastening their development (see pictures, page 759). This incubator is the mound or dome of pebbles or vegetable detritus, which surmounts the subterranean nest of many of the more conspicuous species of North America and Eurasia, especially in mountain regions, where the summers are so short that the ants have to utilize every bit of mid-day heat in order to bring their young to maturity.

The mound is riddled with chambers and galleries and is not only fully exposed to the sun, so that its temperature is several degrees higher than that of the surrounding soil, but its slopes are often constructed in such a manner to catch the heat rays perpendicularly and form the most effective regions of the heavens. This orientation of the nests is indeed often so conspicuous and definite that they can be used as compasses (see pictures, pages 742, 759).

In the tropics where the soil is often saturated or flooded with water during the rainy season, and where devices for conserving the heat are quite unnecessary, many ants have learned to construct paper nests on the trees. Such nests superficially resemble the nests of wasps. They contain no combs, however, but only a maze of irregular, intercommunicating galleries and chambers. A few tropical species belonging to three different genera (*Œcophylla, Myrma,* and *Camponotus*) inhabit nests consisting in part at least of a fine silken web.

REPAIRING THE NEST WITH SILK

It was long a mystery how ants could manufacture silk, but it has been recently shown that the ants themselves do not spin the silk, but use their larvæ for this purpose. The process can be actually observed by making a rent in the wall of the nest and then following the movements of the ants under a magnifying glass. They separate into two brigades, one of which stations itself on the outside of the nest and draws the edges of the rent as close together as possible by pulling with claws and mandibles, while the other, inside the nest, moves the spinning larvæ back and forth across the gap till it is filled out with a dense felt-work of extremely fine silken threads (see picture, page 764).

Photo by Mr. J. G. Hubbard and Dr. O. S. Strong

PORTION OF A COLONY OF AN AMERICAN SLAVE-MAKING ANT (*Formica sanguinea subintegra*) (SEE TEXT, PAGE 748)

Two females after the removal of the wings, three workers, and a number of worker cocoons, nearly twice the natural size

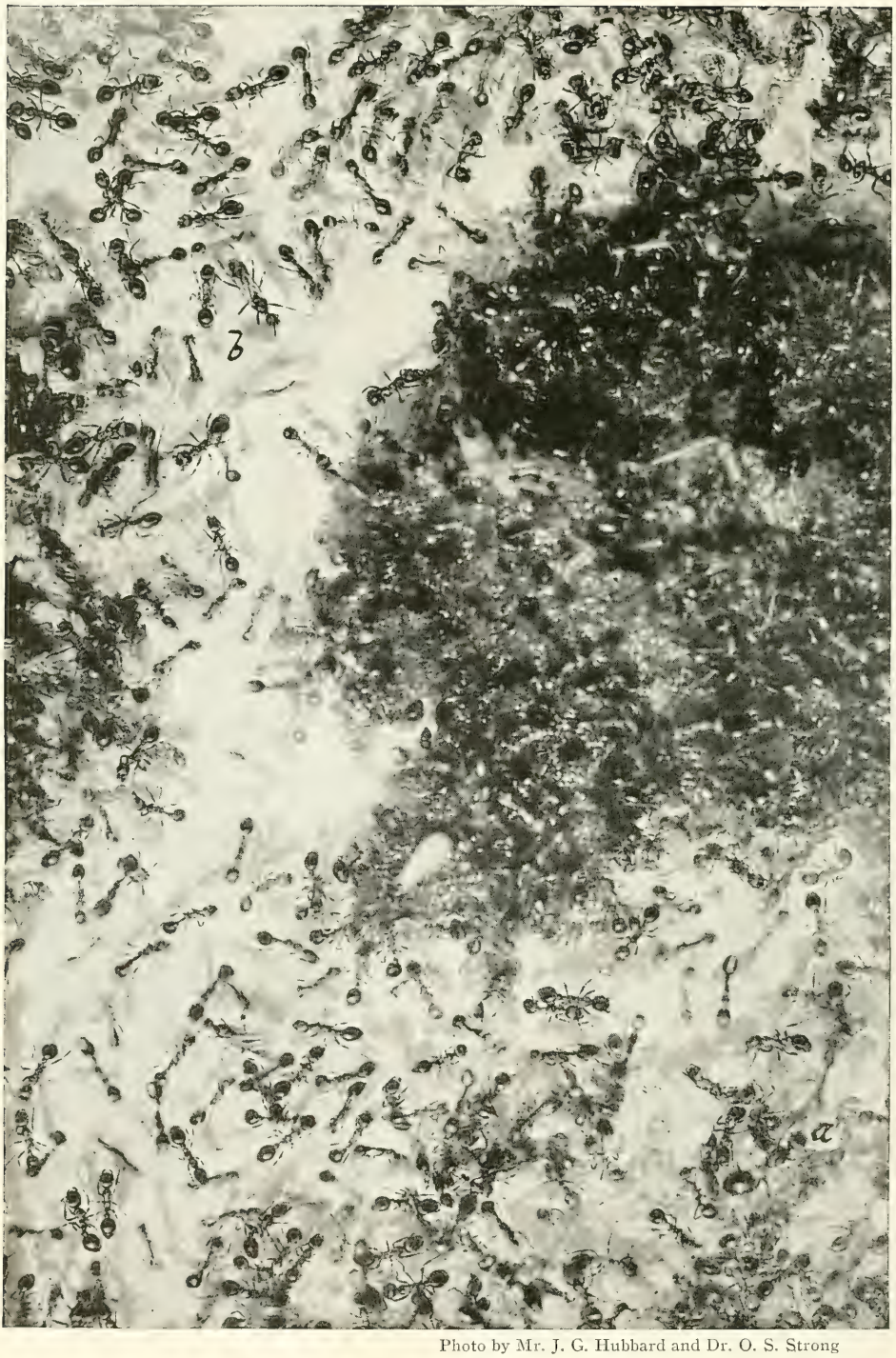


Photo by Mr. J. G. Hubbard and Dr. O. S. Strong

COLONY OF *Aphœnogaster picea*, A COMMON ANT IN THE WOODS OF THE EASTERN STATES

The mother queen of the colony is seen at *a* in the lower right-hand corner of the photograph, a male at *b* in the upper left-hand corner

Photo by Mr. J. G. Hubbard and Dr. O. S. Strong

WORKERS OF THE COLONY OF *Aphœnogaster picea,* SHOWN IN THE PRECEDING PICTURE

In this rather primitive ant the workers are all of the same size and shape, not polymorphic as in *Camponotus americanus* (see pages 735, 737, and 738) and many other species. Magnification about twice the natural size.

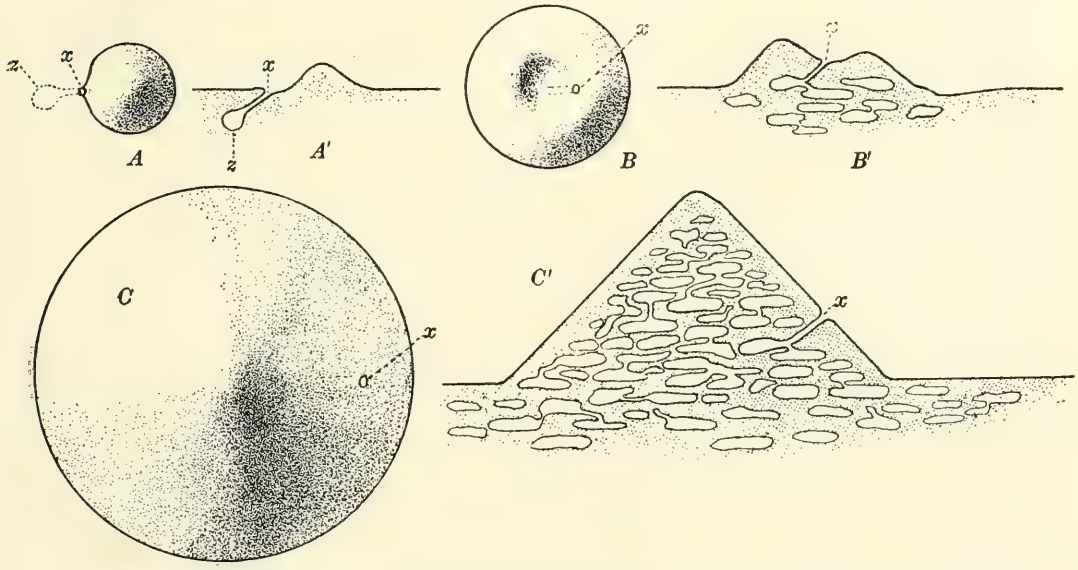
LARGE NEST OF THE MOUND-BUILDING ANT (*Formica exsectoides*)

This nest, located at Scotch Plains, N. J., is 1 meter high, has a basal diameter of 3.25 meters, and a circumference of 10.21 meters

Photo by the Author

NEST OF THE OCCIDENT ANT (*Pogonomyrmex occidentalis*) WHICH BUILDS INCUBATORS FOR ITS YOUNG

On the Dry Plains at Las Vegas, New Mexico. The nest cone has its entrance near the base and nearly always on the east or south side. It is closed at night by the workers, and the advantage of having it in this position is to insure its being opened earlier in the morning when the warmth of the sun awakens the workers (see text, pages 746 and 747).



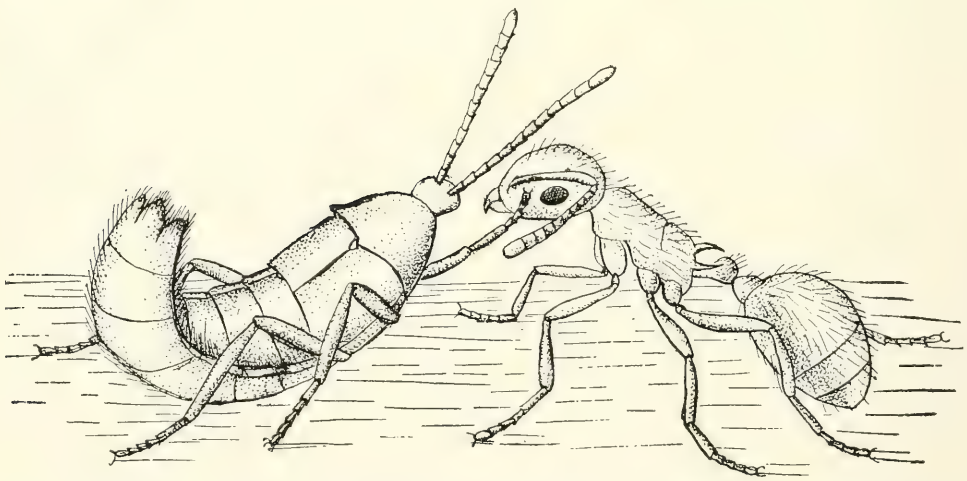
DIAGRAMS OF THREE STAGES IN THE DEVELOPMENT OF THE NEST-MOUNT OF THE OCCIDENT ANT (*Pogonomyrmex occidentalis*) WHICH BUILDS INCUBATORS FOR ITS YOUNG

A, small mound of earth thrown up by the queen when starting her formicary; *x*, entrance; *z*, first chamber; *A'*, same nest in section; *B*, crater nest (second year) formed by incipient colony; *B'*, section of same; *C*, dome of adult colony; *C'*, section of same showing galleries and chambers used for incubation of the young (see text, pages 746 and 747).

Photo by the Author

MOUND OF THE THATCHING ANT (*Formica rubiginosa*) OF COLORADO

The mound, which is made of coarse twigs and grass-blades, may be two or three feet in diameter



ANT GUEST OR PARASITE (*Atemeles*) SOLICITING FOOD FROM A WORKER *Myrmica* (AFTER E. WASMANN)

The beetle strokes the cheeks of the ant in order to induce her to regurgitate a drop of liquid food from her social stomach. Any insect which by means of its shape, odor, or behavior can delude the ants into feeling that it may be another out or one of their larvæ can secure free board and lodging in their nests (see text, page 748).

Photo by the Author

MALE AND WORKERS OF A SOUTH AFRICAN DRIVER ANT (*Dorylus fimbriatus*)

The male is a very large, hairy insect with large eyes; the workers are small and blind, but vary greatly in size.

The driver ants (Dorylii) in the tropics of the Old World and the allied legionary ants (Ecitonii) in the corresponding regions of America do not confine themselves to collecting dead or disabled insects. They move in long files over or immediately beneath the surface of the ground and capture myriads of living insects and their larvæ. So efficient are they in exterminating all kinds of vermin, including rats and mice, that they are welcomed into the houses, even if their owners are obliged to vacate for the time being.

In some countries the ants are regarded as useful allies in destroying the insect pests of plantations. According to Magowan, quoted by McCook (1882): "In many parts of the province of Canton, where, says a Chinese writer, cereals cannot be profitably cultivated, the land is devoted to the cultivation of orange trees, which, being subject to devastation from worms, require to be protected in a peculiar manner, that is, by importing ants from the neighboring hills for the destruction of the dreaded parasite. The orangeries themselves supply ants which prey upon the enemy of the orange, but not in sufficient numbers; and resort is had to hill people, who, throughout the summer and winter, find the nests suspended from branches of bamboo and various trees. There are two varieties of ants, red and yellow, whose nests resemble cotton bags.

"The orange-ant feeders are provided with pig or goat bladders, which are baited inside with lard. The orifices they apply to the entrance of the nests, when the ants enter the bag and become a marketable commodity at the orangeries. Orange trees are colonized by depositing the ants on their upper branches, and to enable them to pass from tree to tree, all the trees of an orchard are connected by a bamboo rod."

An interesting side-light is thrown on the various nutritive, reproductive, and protective devices in ants by the behavior of the insects that live as guests or parasites in their nests. Of these insects, called myrmecophiles, some 1,500 species have been described, a wonderful assemblage of creatures whose sole aim in life is to exploit the ants. They stay in the nests because these afford warmth, food, and protection. Some myrmecophiles feed on the larvæ and pupæ, or even on the adult ants, and some, known as true guests or symphiles, have developed glands that emit a redolent secretion which seems to fascinate the ants much as a catnip fascinates cats. The more highly developed of these true guests are fed and reared by the ants as if they were ant larvæ.

EVER READY HOSPITALITY

The only explanation of such extraordinary behavior towards parasites which eventually injure or destroy the colonies they infest must be sought in the inordinate fondness of the ants for their own brood and for one another. Observation and experiment have shown that any insect which, by means of its shape, odor, or behavior can delude the ants into feeling that it may be another ant or one of their larvæ, can secure free board and lodging in their nests (see picture, page 760).

Having discussed some of the more

NEST OF AN ARBOREAL BRAZILIAN ANT (*Azteca trigona*)

This nest consists of paper (carton) and is built around a branch of the trumpet tree (*Cecropia adenopus*). (Photograph from a specimen in the American Museum of Natural History.)

Photo by the Author

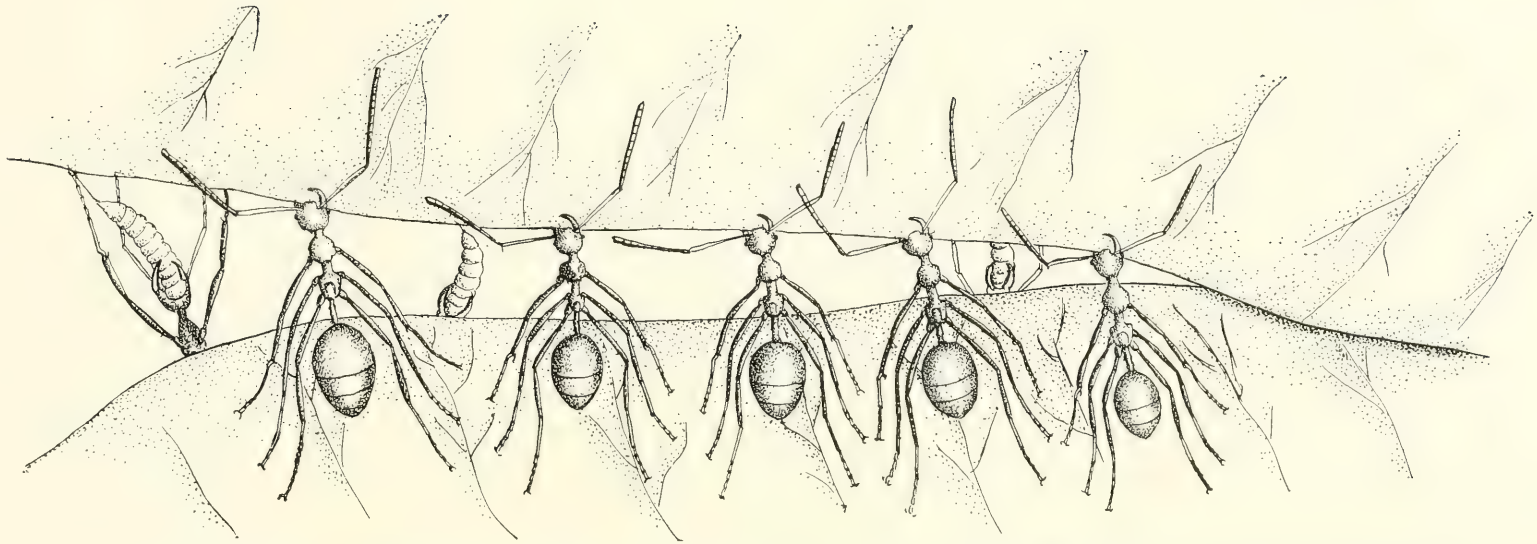
INCIPIENT COLONY OF CARPENTER ANT (*Camponotus pennsylvanicus*)

The queen has established her colony in the abandoned cocoon of a beetle (*Rhagium lineatum*) under pine bark, has reared a few small workers, and has started a second brood, represented by a small cluster of larvæ in the upper part of the chamber (see text, pages 741-742). In incipient ant colonies the queen mother takes no food often for as long a period as 8 or 9 months, and during all this time is compelled to feed her first brood of larvæ exclusively on the secretion of her salivary glands.

striking peculiarities which the ants have developed during the long course of their evolution, a word may be added in conclusion on the prospects of future developments. It must be confessed that these prospects are not very bright, for, strange as it may seem, there are no indications that these insects have made any considerable evolutionary progress since early Tertiary times.

The exquisitely preserved ants of the Baltic amber, belonging to the Lower Oligocene formation, are in all respects like existing ants. All of them belong to existing subfamilies, most of them even to existing genera, and a few of them are practically indistinguishable from species inhabiting Europe today. That some of them were herders of plant-lice is proved by blocks of amber containing masses of ants mingled with the plant-lice which they were attending when the liquid resin of the Oligocene pines flowed over and embedded them. Possibly the soldier caste is a recent innovation, but the differentiation of the males, queens, and workers was as extreme and precisely of the same character then as now.

This seems to force us to the conclusion that all the great features of ant-life must have been established during the Mesozoic Age, and although many spe-

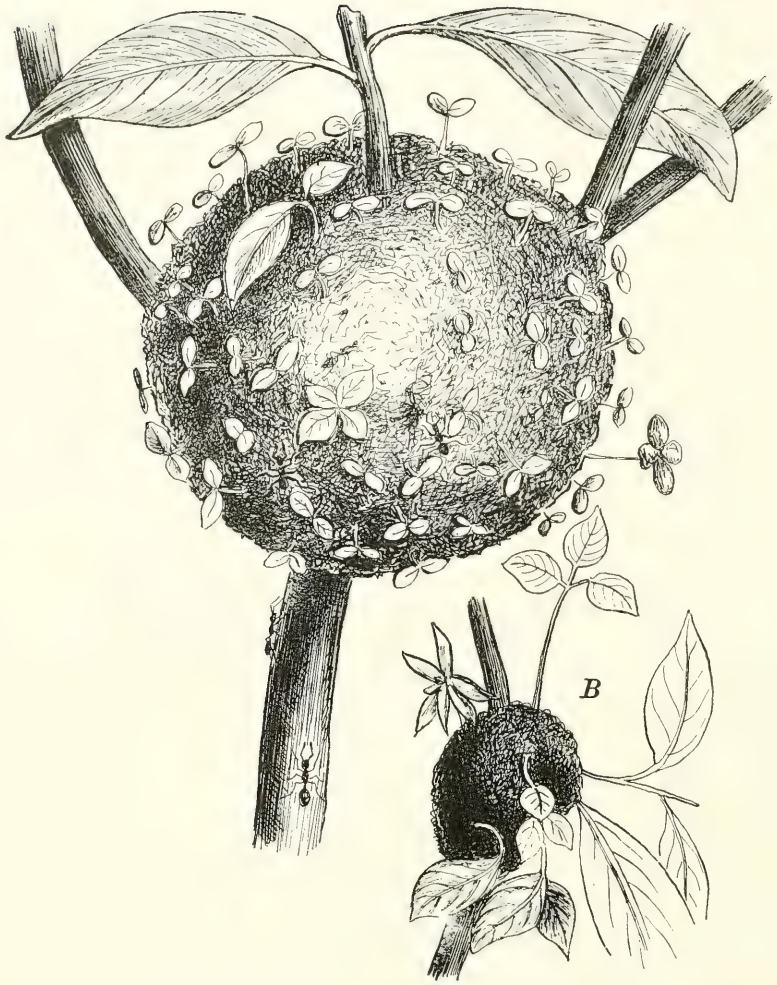


THE REPAIRING OF A RENT IN THE NEST OF THE RED TREE ANT (*Œcophylla smaragdina*) (AFTER F. DOFLEIN)

The nest is made of leaves, held together with a silken web. The figure shows the workers repairing a rent, one brigade of them being occupied in drawing the edges of the leaves together, while the others on the inside of the nest move the spinning larvæ back and forth across the gap (see text, pages 747 and 748).

AN EPIPHYTIC ANT PLANT (*Myrmecodia pentasperma*) OF THE BISMARCK ARCHIPELAGO (AFTER F. DAHL)

The large pseudobulb is filled with cavities, which are nearly always tenanted by ants (*Iridomyrmex cordatus*)



ANT GARDENS OF THE AMAZON (AFTER E. ULE)

A a large, *B* a small spherical, sponge-like mass of earth which is built around the axils of the branches of trees in the tropical forests and, according to Ule, is seeded by the ants with parasitic plants.

cies, subspecies, and varieties have since arisen and may yet arise, we must nevertheless admit that the future development of the group will probably be limited very largely or exclusively to a more minute differentiation of existing forms and a greater refinement of existing modes of behavior.

THE GRANDEST AND MOST MIGHTY TERRESTRIAL PHENOMENON: THE GULF STREAM

By John Elliott Pillsbury, U. S. Navy

THE subject of ocean currents is one that has engaged the attention of mariners and men of science for centuries. In all oceans there are movements of the water (other than that caused by the tides) which may be said to be due primarily to the prevalent wind.

Many branches of scientific inquiry are concerned in their examination, for they bear directly upon the dissemination and evolution of species and the deposit and structure of geological formation, while in the business world they enter as a factor in the price of everything carried afloat as well as in the safety of all those who travel by sea. The currents of the ocean too are the great transporters of the sun's heat and moisture from the torrid zone, to temper the climate of more polar regions.

In the two great oceans, the Atlantic and the Pacific, there is to be found both north and south of the equator, and also in the Indian Ocean, a similar circulation, that is, a general westerly movement in the tropics, a flow toward the poles along the eastern shores of the continents, an easterly set in the temperate zones, and a current toward the equator along the western shores. It thus becomes a grand circular movement, some parts being quite slow, and other parts very swift; sometimes there may be a temporary interruption in the slower portions, or perhaps even a reversal, but taken as a whole the movement is continuous (see map, page 768).

In the North Atlantic Ocean the currents are probably more pronounced than in either the Pacific or the Indian Oceans. Without entering upon a discussion now as to the causes of ocean flow, or of any particular current, a brief description of the main streams will not be out of place, for they are all connected more or less intimately with our Gulf Stream.

The equatorial current is usually described as being a broad band of water moving across the Atlantic in the tropics. The portion of this current situated south of the equator is divided into two parts upon meeting the eastern salient of South America, Cape St. Roque. One branch turns south toward the Antarctic, while the other is forced to the westward along the shores of Northern Brazil and the Guyanas, and is called the Guyana coast current. The equatorial current north of the equator has an almost uninterrupted progress until it reaches the Windward Islands, but a portion of it also impinges against the Guyana Coast and thus augments the volume of that current.

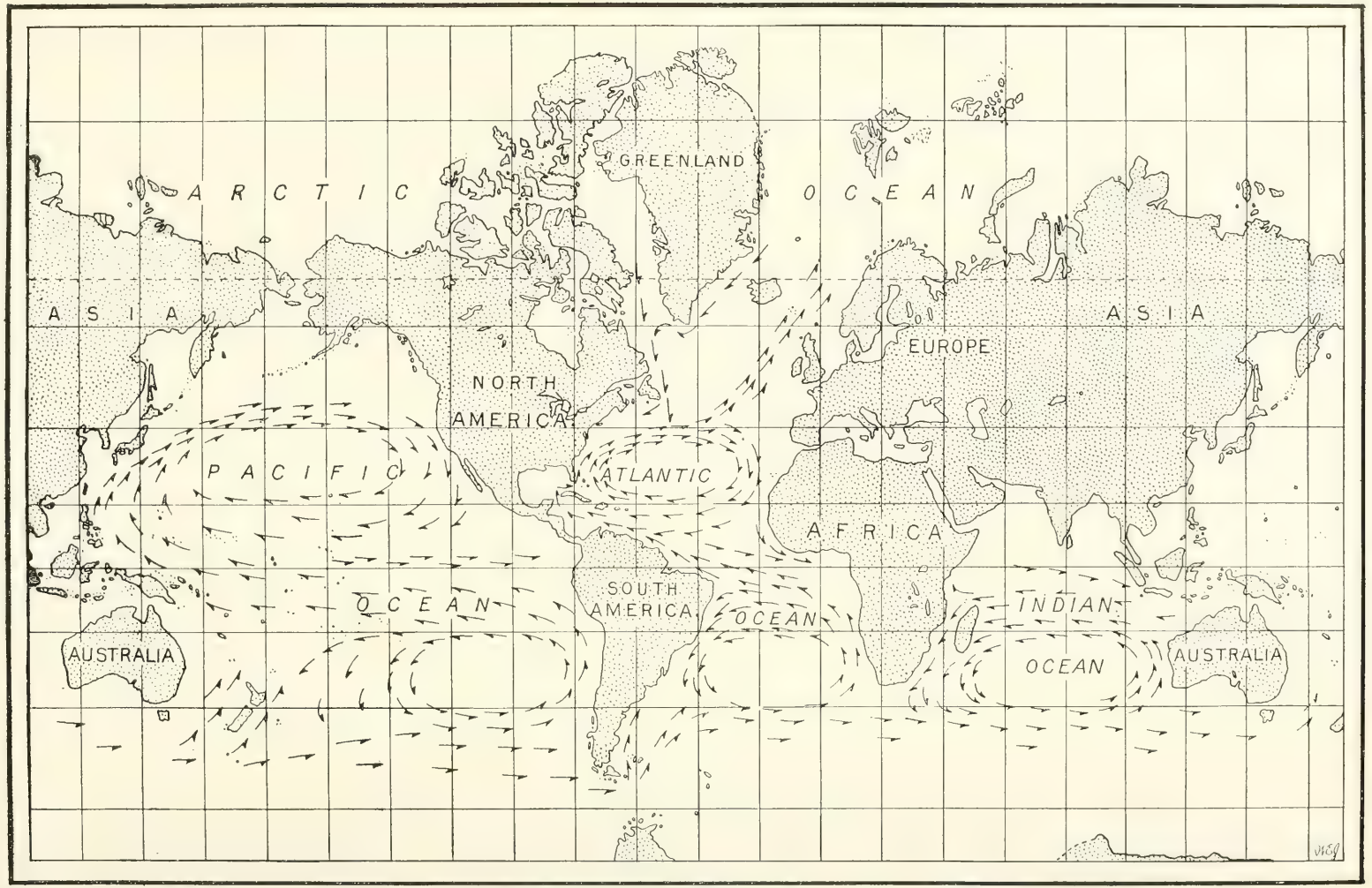
At the Windward Islands both are united, and a portion of the flow enters the Caribbean through the various passages, crosses it to the Yucatan and Honduras coasts, and thence into the Gulf of Mexico, from which it issues through the Straits of Florida as the Gulf Stream. Passing onward toward Europe it is augmented in volume by a part of the north equatorial current that sweeps along outside the West Indian Islands and the Bahamas, and while this current is slow in movement in comparison to the Gulf Stream itself, it doubtless carries a much greater number of heat units to help warm up northern Europe.

The Gulf Stream, or rather the combined flow mentioned above, divides as it meets the resistance of the Eastern Continent, one branch flowing south along the African coast, while the other proceeds northward into the Arctic toward Spitzbergen and Franz Joseph Land.

THE IMMENSITY OF THIS OCEAN RIVER

The Gulf Stream is probably the grandest and most mighty of any terrestrial phenomenon. Its waters are characterized by a deep indigo blue color of great clearness and high temperature. It can be penetrated by the eye to considerable depths, and generally its meeting with the less saline polar waters can be at once distinguished.

It is difficult for the mind to grasp the



MAP OF THE WORLD, SHOWING THE PRINCIPAL OCEAN CURRENTS

immensity of this great ocean river. The Straits of Florida at its narrowest point is about 40 miles wide and observations here numbered between three and four thousand, surface and subsurface. A calculation of the average volume of water passing in one hour gives the enormous sum of 90 billion tons. If this one single hour's flow of water could be evaporated, the remaining salts would require many times more than all the ships in the world to carry it.

When one is on board a vessel, floating upon its waters, one is not as much impressed at the power and grandeur of this wonder of nature as he is when he stands before a towering mountain, an immense iceberg, or a fall of water such as Niagara, but when one remembers that the mighty torrent, speeding on hour by hour and day by day in a volume equal to all the largest rivers in the world combined, carrying its beneficient heat to temper the climate of continents, one begins to realize that of all the forces of the physical world none can equal this one river of the ocean.

THE INFLUENCE OF THE GULF STREAM ON THE COLONIZATION OF AMERICA WAS VERY GREAT

It is interesting to note in the history of the Gulf Stream how great its influence has been on the fortunes of the New World. Before the discovery of America, strange woods and fruits were frequently found on the shores of Europe and off-lying islands. Some of these were seen and examined by Columbus, and to his thoughtful mind they were convincing evidence of the fact that strange lands were somewhere to the westward. These woods were carried by the Gulf Stream and by the prevailing winds from the American continent, so that in part, the stream is responsible for the discovery of the New World.

Ponce de Leon, while on his famous search for the Fountain of Youth, made the discovery of this great stream. After his failure to find, on the coast of upper Florida, the means of cheating death, he turned to the southward and skirted the shore for hundreds of miles, thus stemming the current.

Referring to this in his journal he describes that they found a current that, though the wind was good, they could not stem. It seemed that their vessels were going fast through the water, but they soon recognized the fact that they were being driven back in spite of the strong and favorable wind. Two of the ships near the coast were able to anchor, while a third, being in deeper water, was "soon carried away by the current and lost from sight, although it was a clear sky."

The first one to traverse the Gulf Stream from the Gulf of Mexico was Antonio de Alaminos, who had been with Columbus on his last voyage, and had been with Ponce de Leon among the Bahamas and along the coast of Florida from St. Augustine to Tortugas. Later he was in chief command of the fleet with Cortez in Mexico, and when it was desired to send dispatches and presents to Spain he was chosen as the one most able to carry out the nautical part of the mission. He sailed from Mexico, and in order to avoid foreign enemies and domestic rivals, took the route north of Cuba and through the Straits of Florida into the Atlantic.

The influence of the Gulf Stream in the colonization of America was very great. The division of the English colonies into New England and Virginia was probably in part due to the routes by which they were reached. Vessels bound from England to New England crossed the North Atlantic outside the limit of the Gulf Stream, or in a feeble adverse current. They had the advantage too, of crossing the Newfoundland Banks and of being able to surely replenish their provisions by fishing.

This voyage, however, much as the advantages might be either by the shorter distance or the gaining of food, was not thought to be practicable with a vessel bound to the Southern Colonies. They sailed south to the trade-wind region, through the Caribbean and around Cuba, thence following the Gulf Stream to their port.

The Dutch adopted this passage to the Hudson, so that really Nantucket Island became the dividing line between the two

voyages; a difference of 100 or 200 miles in destination caused a difference in the length of the passage of about 3,000 miles.

BENJAMIN FRANKLIN PUBLISHED THE FIRST CHART OF THE GULF STREAM

The whalers of New England were the first to gain a fairly accurate knowledge of the limits of the stream between Europe and America by following the haunts of the whales, which were found north of one line and south of another, but never between the two.

Benjamin Franklin heard of their experiences, and also how the coasting vessels from Boston to Charleston, South Carolina, would take sometimes three or four weeks to make the voyage south, while the return trip would often be made in a week. Then his attention was drawn to the fact that English packets with American mails were two or three weeks longer on the voyage to America than American merchant ships.

Franklin investigated the question and published a chart in 1770 for the benefit of the mail packets, but its information was discredited by the English, and before it came to be generally known and used, the war of the Revolution was on, and Franklin, knowing the advantage of the knowledge of the limits of the stream would be to British naval officers, suppressed it all he could until hostilities ceased.

The name of "Gulf Stream" was first suggested by Benjamin Franklin because it issues from the Gulf of Mexico. While it is only a part of the grand scheme of ocean circulation, and the Gulf of Mexico is in reality only a stopping place, as it were, for its waters, this name is generally applied to the current now as it was given by Franklin—that is, the current coming from the Gulf of Mexico and spreading abroad over the North Atlantic.

In the large funnel-shaped opening between Cuba and the western extremity of the Florida reefs the current is somewhat erratic, but by the time Havana is reached it has become a regular and steady flow. As it rounds the curve of the Florida shore, the straits contract and the current then practically fills the banks from shore to shore and reaches almost to the bottom, which at this point has a greatest depth of nearly 3,000 feet. I say almost because in its variations in velocity sometimes it does actually reach the bottom, but at other times it does not.

As it leaves the Straits of Florida its direction is about north, but it gradually changes and follows a course approximately parallel to the curve of 100 fathoms depth until it arrives off Cape Hatteras, and maintains about the same width as when it issued from the Straits of Florida. From this point it starts on its course to Europe. It has lost something in velocity as well as in temperature, and as it journeys to the eastward it gradually diminishes in both, until at last it becomes a gentle flow.

On this part of its course it passes not far from the Grand Banks of Newfoundland, where it is met almost at right angles by the great Labrador current, bringing down from the Arctic a stream of cold water, pack ice and icebergs, and which has recently been the cause of such an appalling disaster in the loss of the *Titanic*. This current, passing along the eastern shores of Newfoundland, bearing its freight of ice, sends part of its current southward and westward around Cape Race; part overflows the banks on a general southerly course and part passes to the southward along the eastern side of the banks.

When this cold current meets that of the Gulf Stream of much higher temperature, the former underruns the latter. The shallow-draft pack ice, being no longer under the influence of the polar current, is carried to the eastward by the warm Gulf Stream current and soon disappears, but the deep-draft bergs are still under the influence of the lower current running south, as well as of the surface current running east, and so they continue on until well into the Gulf Stream, sometimes reaching the thirty-ninth parallel, which is nearly 200 miles south of the southernmost point of the Grand Banks.

This ice, together with the fog, which usually accompanies the meeting of currents of considerable differences in tem-

perature, has compelled steamship companies to adopt lanes of travel and to make a detour around the region of danger. That the western-bound track was shaving dangerously near the limit of ice in the spring, when bergs are numerous, has been shown, and it is probable that the new lanes now used which lie further south will be permanently adopted during the ice period.

THE CAUSE OF OCEAN CURRENTS

The theories as to the cause of ocean currents have been many. Columbus thought the stars, the air, and the waters of the sea all had the same motion around the earth from east to west and declared that the force of the equatorial current had washed away the land and thus formed the Windward Islands.

Toward the end of the 17th century the belief seemed to be that all ocean circulation was maintained by means of subterranean passage or abysses. A current, upon meeting land, descended into the earth and ran through a tunnel to the other side of the obstruction.

Strange to say, the writer was called upon in recent years to examine a paper written by a gentleman whose theory was somewhat similar to the above. He believed that all mountain ranges were simply the visible evidence of a tunnel conveying water from one ocean to another, the Rocky Mountain tunnel being the conduit by means of which water was transported from the Arctic to the Gulf of Mexico to form the Gulf Stream. Another theory was that the tropical sun evaporated so much water that the African Coast current ran to fill up the hollow so formed.

In recent times the course of currents has been laid to rivers and the Gulf Stream chiefly to the Mississippi. In actual fact about 2,000 such rivers would be required.

Some eminent men have attributed currents to the revolution of the earth, others to the differences in the density of the ocean at the equator and at the poles.

Franklin's theory, which has many advocates at the present day, was that the winds produce the current by the air moving over the surface of the water, and he illustrated this theory by the following: "It is known that a large piece of water, 10 miles broad and generally only 3 feet deep, has by a strong wind had its water driven to one side and sustained so as to become 6 feet deep, while the windward side was laid dry." As will be seen later, this is a well-taken example of the force of the wind in causing the Gulf Stream, but it does not quite show the whole of the truth.

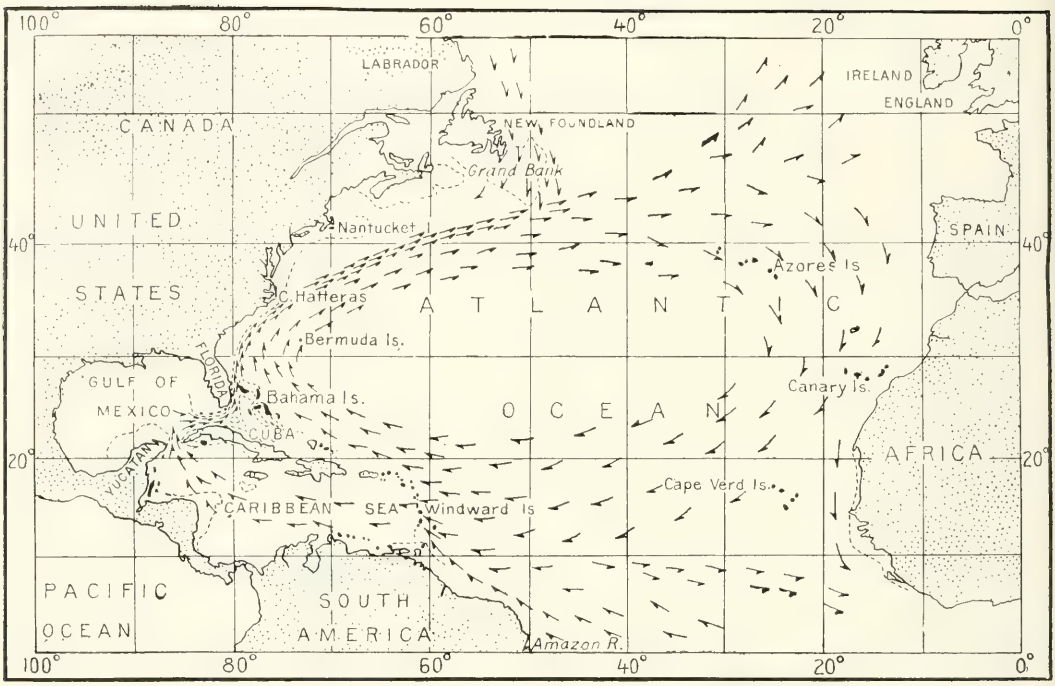
None of these theories were based upon direct evidence by observations in the Gulf Stream, but all were inferences drawn from temperature of the water, from laboratory experiments, from the drift of vessels, or from reasoning based upon opinions of what ought to be.

Much time and labor has been devoted toward attempting to define the limits of ocean currents and their velocities. Columbus on his first voyage, when nearing his final land fall, was trying to find the depth of the water one day, when he noticed that the line inclined to the southwest, from which he concluded that the surface was moving faster than the lower stratum which contained the weight on the end of the line.

Franklin endeavored to use the thermometer to define the limits of the polar and tropical waters, and hence the current. This method is often correct, for without doubt tropical water is warmer than that coming from the poles, but it has been found that at times the warm tropical water may be blown by the wind over and onto the polar stream and then partake of its motion or, as in the Labrador current, underrunning the warm water of the Gulf Stream. Temperature is not a sure indication of how the current may be setting.

Almost all governments at one time issued instructions to their naval officers and requested the coöperation of the officers of their merchant marine to keep a record of the temperature of the surface water, and by the compilation of these data the supposed limits of most ocean currents were placed upon the charts.

A method of determining the velocity of the currents has been in use since the introduction of comparatively accurate navigation. A vessel is moved at sea, by



OUTLINE MAP SHOWING GENERAL DIRECTION OF THE GULF STREAM AND OTHER CURRENTS IN THE NORTH ATLANTIC OCEAN

the wind or by engines, as nearly as possible on a given compass course and for a given distance as ascertained by the log or by the engine revolutions, but she is deflected from that course and distance by winds, waves, bad steering, etc., *and by currents* to an unknown amount. By astronomical observation the captain ascertains the position of his ship from time to time, and the difference between this position and the supposed position is assumed to give the direction and velocity of the current affecting the ship during the interval.

Still another method has been practiced, and even now is favored by some for determining the flow of currents. Bottles or floats of various descriptions are thrown overboard from vessels at sea, each one containing a paper on which is written the date and position at which it is put afloat, and a request printed in various languages asking the finder to mark the date and locality where found and forward it to some official.

This method is of but little real value. The bottle is tossed by the waves and driven by the wind. If it is picked up on the shore, there is no means of knowing how long it has been traveling at sea and how long idle on the beach and when it is found, all that it tells is that it has journeyed from one point to another, but by what route it is impossible to tell.

Floats put adrift in the Atlantic between Newfoundland and the Azores have been found distributed, some of them years afterward, all the way from Iceland and Norway to the West Indian Islands and on the shores of the Gulf of Mexico.

The importance of a knowledge of the Gulf Stream to commercial interests was early recognized by the Congress in the passage of an act authorizing the Coast Survey to include it within the scope of its work, and later, authority was given to examine the Sargasso Sea (the body of water lying in the center of the grand circular movements of currents in the Atlantic) and also the mate to the Gulf Stream in the Pacific, called the Kuro-Shiwo, or Black Stream, of Japan, which pours its warm waters toward our western shores to temper its climate, in the

same way that the Gulf Stream does for Europe.

The superintendent of the Coast Survey, Prof. A. D. Bache, between 1844 and 1860 caused thousands of thermometrical observations to be taken on lines extending across the stream, from Key West to well beyond Hatteras, reasoning on the line of Benjamin Franklin's studies, that temperature alone could define its limits, and that the warmest water within these limits would be the axis or the swiftest current.

He found, however, that there were bands or streaks of warm and cold water in the stream, the cause of which was attributed to irregularities in the bottom over which it flowed, but this was based upon erroneous measurements of the depths, for in later years, with wire sounding lines instead of rope, the bottom has been found to be nearly even.

For ascertaining the relative velocity of the Gulf Stream between the surface and subsurface on a given line, trials were made by floating a single can almost submerged on the surface and a pair of cans, one on the surface and the other suspended by a cord at a given depth below. If both were started together, one being only influenced by the surface current and the others being influenced by the surface and the subsurface as well, the retarding or accelerating effect of any difference in velocity might be determined.

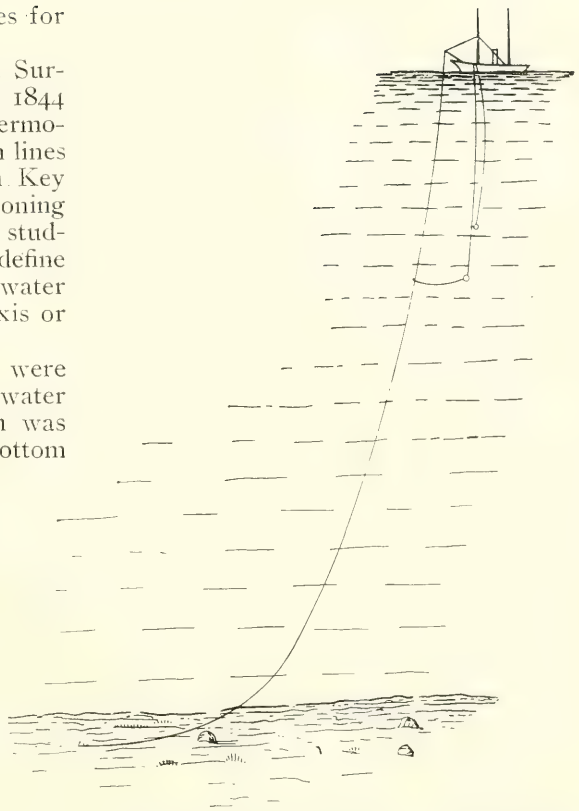


DIAGRAM SHOWING THE METHOD OF OBTAINING THE CURRENT OBSERVATIONS ON BOARD THE "BLAKE"

The current meter at the end of the wire on the right, slides down another larger wire having at its end a heavy leaden weight, which in turn is restrained from being swept astern by the force of the current by a long line secured to the anchoring rope.

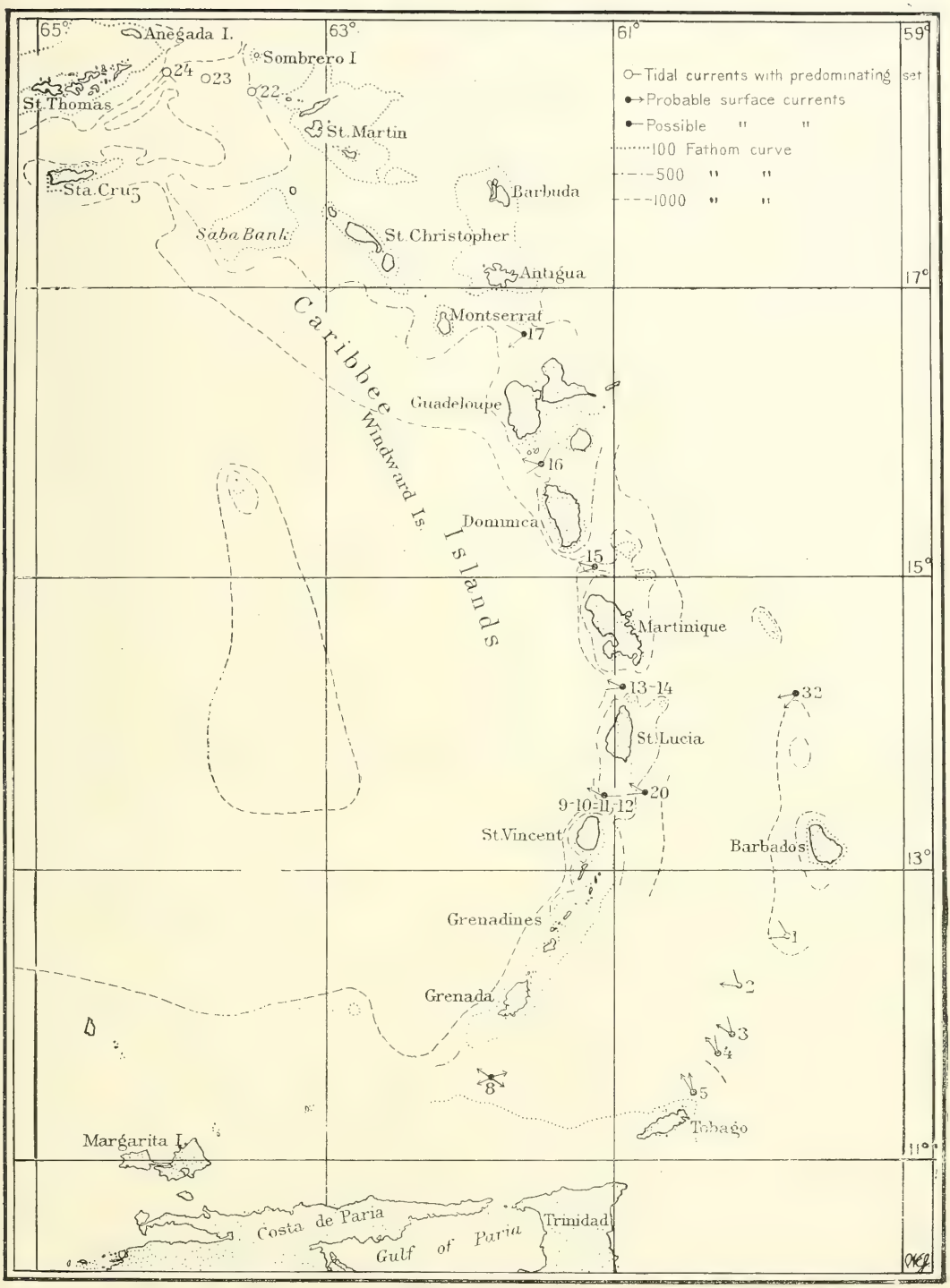
In 1883 the Coast Survey Office decided to attempt to anchor a vessel in the Gulf Stream and to actually measure the amount of water flowing past. It was thought that this might be accomplished by the use of wire rope instead of a hemp cable or chain, both on account of its strength and flexibility, and also because it could be made in great lengths. The first trial at anchoring in the Gulf Stream was made by the little Coast Survey schooner *Drift*, but with no steam power to handle the wire rope anchoring line the difficulties were great. The result of this first attempt was the detail of a Coast Survey steam vessel, the *George S. Blake*, for the Gulf Stream work.

A new departure was then made from the ordinary method of anchoring in very deep water. A great length of wire rope (over 4½ miles) was carried on a large iron reel or spool. A powerful steam-engine, running a winch, lowered and raised the wire rope with its anchor, while another engine revolved the spool. A special arrangement of rubber buffers was applied to the anchoring rope, whereby the sudden strain, due to violent pitching of the vessel, was reduced to a minimum. By this system the *Blake* was able to anchor in almost any depth of water, and did anchor in depths of more than two miles many times.

To gain a knowledge of the laws governing the flow of any current, it is neces-

THE COAST SURVEY STEAMER "BLAKE" AT ANCHOR IN THE EQUATORIAL CURRENT, 60 MILES NORTH OF BARBADOS, IN 1100 FATHOMS OF WATER

The trade winds were temporarily interrupted. The ship was riding to the current coming from the east, although, as will be seen from the pennant at the masthead, the wind was from the west. When this photograph was taken the ship was anchored at Station 32, shown on map, page 775.



DIRECTION OF THE CURRENTS IN THE PASSAGES OF THE WINDWARD ISLANDS

The numbers indicate the record number of the anchorage whether occupied once or many times. The ship was anchored at Station 32, north of Barbados, when the photograph (shown on page 774) was taken.

sary to ascertain its direction and velocity not only on the surface, but below. The surface current is the one affecting the ship on its course, but it is also the most affected by changes in the local wind, which may be only temporary, while the vast body of flowing water maintains its direction, but feebly influenced by the slight surface changes.

An instrument was therefore designed by which the lower currents could be measured as well as the surface. It consisted of a rudder free to take the direction of the current, a compass needle which of course pointed to the north, and an apparatus for registering the flow. Upon hoisting the instrument all of these were locked at once, and upon its reaching the surface the angle between the rudder and the compass gave the direction, and the reading of the register showed the velocity.

Observations were usually made with the current meter at depths of 3½ fathoms, 15, 30, 65, and 130 fathoms, and at times to 150 and 200 fathoms, the instrument remaining at each depth during a period of 30 minutes.

The investigation began with these appliances in the narrowest parts of the Straits of Florida (between Fowey Rocks, which is near Miami, and the Bahamas) in order to find out the characteristics of the stream at a point where it would perhaps be least influenced by abnormal forces. After two seasons at this point the research was extended to the western part of the straits and to the passage between Yucatan and Cuba to gauge the water entering and leaving the Gulf of Mexico. Afterward, the equatorial current and the flow into the Caribbean between the islands were examined in order to compare what may be called the source of the Gulf Stream with the outlet as it leaves the Straits of Florida for the Atlantic. The stream off Cape Hatteras, the flow outside the Bahamas, and also south of Nantucket were all examined.

Some of the results of the investigation were surprising. The volume of the stream in 1 hour's flow has been mentioned, but the most valuable discovery was that it changes its velocity daily and monthly, and that predictions can be made as to the times of these variations. As the tides change in height on the coast, so the current changes in velocity in the ocean. The equatorial current along the South American coast runs fastest about 6 hours before the moon crosses the upper meridian; between Cuba and Yucatan the maximum is 10 hours before, and in the Straits of Florida off Fowey Rocks it is 9 hours.

These variations at certain times in the month amount to more than 3 miles per hour in some parts of the stream and at other times in the month may be less than 1 mile per hour.

During the month there is another change taking place following the changes in the declination of the moon north and south of the equator. Two or three days after the moon has passed the equator the maximum velocity of the stream is nearest the middle, but which it never reaches; it is always to the left of the middle, and two or three days after the moon's highest declination the maximum is well toward the left-hand edge of the stream.

Accompanying these changes the temperature of the stream fluctuates. At one time during the month, also varying with the declination of the moon, the direction of the currents, particularly the lower ones, incline slightly toward the axis of greatest velocity, while at other times they run more nearly parallel. This causes an intermingling of the warm surface with the colder water of the lower strata.

WHAT CAUSES THE GULF STREAM?

The various theories as to what causes the Gulf Stream have been given, but it seems that while Franklin's ideas are nearest correct, they are not complete. In the tropical regions there is a steady movement of the air from east to west known as the trade winds. South of a certain line situated near the equator these winds flow from a southwesterly direction, while north of the equator they come from a more northeasterly direction. The winds are not always strong, nor are they constant in direction, but they do not vary much, and then only for brief periods.

Winds blowing over the surface of the water induce a current in the latter due to friction. At first it is only the merest skim that moves, but gradually the motion is communicated from layer to layer until at last, if the wind is long continued as in the trade wind region, the movement extends to lower depths, 300 or 400 feet, or perhaps more.

These trade wind currents meet finally, the partial barrier of the islands forming the eastern part of the Caribbean, and a portion of the flow escapes through the passages between them. From here it continues its course across that sea until it reaches the obstruction of the Honduras and Yucatan coasts, from which it escapes by the easiest route, which is into the Gulf of Mexico.

It has been found, however, that the water entering the Caribbean by this means is not more than one-half of the amount which flows through the Straits of Florida from the Gulf of Mexico, and the other half is supplied from a source which does not come under the head of a measurable current. *The other source is the wave caused by the wind.* Every ripple carries a certain amount of water in the direction toward which it is flowing, irrespective of the current caused by its friction, and when the waves become large, tons of water are hurled from the crest into the trough every time the wave breaks.

In a large area like the Caribbean, having a comparatively constant wind blowing over its whole surface, this action is practically a simultaneous movement of its surface waters to the westward and a continual escape of the water heaped up at the obstruction offered by the land into the Gulf of Mexico, through the Straits of Florida, and into the Atlantic.

The Gulf Stream would be little felt on the coast of Europe did it not receive a great addition to its volume of heat when en route. This is by means of a gentle flow from the northeast trade-wind current that passes outside the Caribbean Islands and the Bahamas. The surface temperature of this outside current is about the same in its passage along the West Indian Islands as the Gulf Stream in the Straits of Florida, but it is less violent in its movements and there is less intermingling of its upper and lower waters, so that it arrives off Cape Hatteras with a much higher temperature than that of the more turbulent Gulf Stream.

THE GULF STREAM HAS NOT CHANGED ITS COURSE

Newspaper items are frequent that the Gulf Stream has changed its course, and to its supposed erratic movement is laid the blame of every abnormal season on our Atlantic seaboard. Gulf weed is seen up toward Nantucket, for example, and so the Gulf Stream must have changed its course in that direction.

The fact is this gulf weed originates in the Sargasso Sea and is transported chiefly by the break of the waves. Some of it enters the Gulf Stream and may be carried by it to beyond Hatteras and further east, but the fact of meeting it in strange regions is not so much an indication of a current as it is that the wind has caused a sea which has thrown the weed to leeward. Any strong southerly gale to the eastward of Cape Hatteras will strip the little gulf weed remaining in the Gulf Stream at that point and carry it toward the Nantucket shores.

The same influence of the wind to transport the water without an accompanying current is seen at Key West. With a southerly wind the clear water of the Gulf Stream is thrown into that harbor in spite of an ebb tide, and it is often accompanied by fragments of gulf weed, but upon a change of wind from the northward (which is from the Gulf of Mexico) the harbor waters soon cloud up.

Quite recently the overwhelming *Titanic* disaster, which was due to icebergs on the border of the eastern extension of the Gulf Stream, has led to the theory that the stream was feeble and had not been flowing with its usual strength and so the bergs were farther south than usual. Of course, there are periods of heat and cold—one year may vary noticeably from another—and perhaps an abnormal amount of heat transported to the Arctic regions some years ago by the

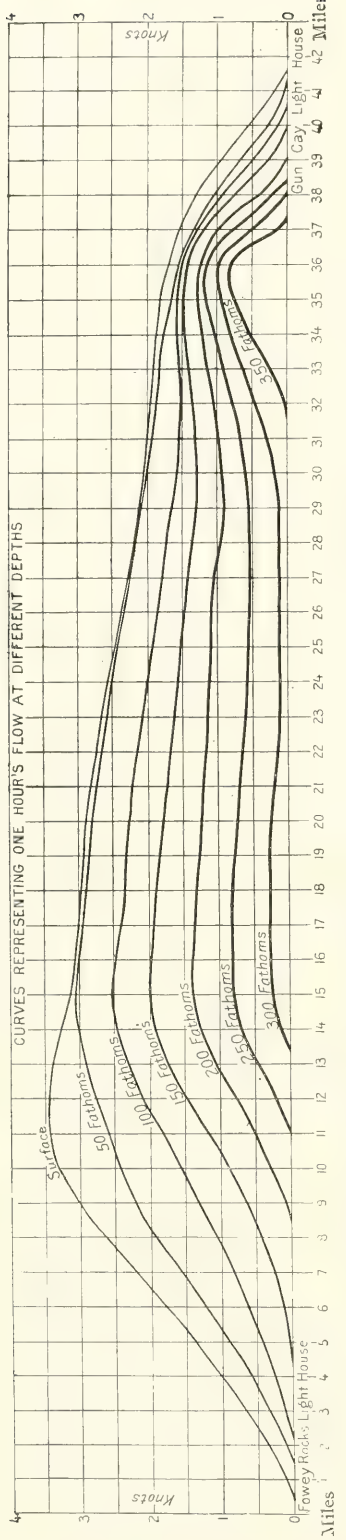


DIAGRAM SHOWING AVERAGE RATE OF FLOW OF THE GULF STREAM AT VARIOUS DEPTHS

stream may have been the cause of some of the bergs in the Atlantic this year, but when it is remembered that heavy ice from the Arctic takes anywhere from one to probably two or three years to make the journey to the steamers' tracks one cannot trace the increase or decrease in quantity or size of the bergs to the Gulf Stream.

Doubtless the stream varies in velocity at different seasons of the year because the trade winds vary periodically in strength and direction. In the winter months, when the northeast trades are stronger, they blow from a more northerly direction and at the same time do not extend to as far a northern latitude as in the summer. During the latter period they have a direction more nearly toward the west, and although weaker in force probably contribute more water to the Gulf of Mexico and hence to the Gulf Stream than do the winter winds.

These changes in the winds, however, are felt in the Gulf Stream by a gradual increase or decrease in its speed some time after, the maximum yearly strength, for example, coming in October, while the maximum trade-wind influence is in July and August.

A temporary or a local increase or decrease in the force of the trade winds would have but little effect on the Gulf Stream, because the current is due to the average condition of the wind over an area of hundreds of thousands of square miles, and this average does not change materially year by year.

Sometimes a low barometer in the Gulf of Mexico, accompanied by an abnormal high on the southern Atlantic coast, will cause a reverse flow on the sides of the stream in the Straits of Florida for a short time, but the *vis-a-tergo* of the great mass of water quickly reëstablishes the normal current.

There is every evidence that the Gulf Stream is governed absolutely by law in all its variations; its course through the ocean is without doubt fixed; its fluctuations are by days, by months, by seasons, or by years, but they do not vary materially one year from the other. So we may conclude, of all the physical forces on this earth that are subject to any variations at all, the great ocean currents are most immutable.

ELEPHANT HUNTING IN EQUATORIAL AFRICA WITH RIFLE AND CAMERA

By Carl E. Akeley

With Photographs by the Author and Copyrighted by Carl E. Akeley

ONE evening in Uganda, when rather discouraged after a day of unsuccessful effort to locate elephants, we suddenly heard the squeal of an elephant far to the east. The squealing and trumpeting increased in frequency and distinctness until in an hour's time we realized that a large herd was drifting slowly in our direction. By eleven o'clock they had come very close, some within two hundred yards of camp, and on three sides of us. The crashing of trees and the squealing and trumpeting as the elephants fed, quarreling over choice morsels, resulted in a din such as we had never before heard from elephants.

Our men kept innumerable fires going for fear that the elephants might take a notion to raid the plantain grove in which we were camped, and at daylight I was off for the day's hunt. The herd had drifted down to the forest side, forty minutes from camp; in fact many of them had entered the forest. For a couple of miles we traveled through a scene of devastation such as a cyclone leaves in its wake: 8-foot grass trampled flat except for here and there an "island" that had been spared; half of the scattering trees twisted off and stripped of bark, and of all branches and leaves.

We approached within a few hundred yards of the forest, where the grass was undisturbed except for trails showing how the elephants at daybreak had trekked through in small bands, single file. When about to cross a little wooded gulley, we thought it wise to stop and look over the situation. From the top of a mass of rocks we discovered a cow feeding only 20 yards away and others all about in the high grass between us and the timber (see page 783).

There was clear passage to a rocky elevation 100 yards to the left, for which we made, and while standing there, 75 feet above the level, I received an impression of Africa that must remain with me to the last.

There was not a breath of wind, and the forest, glistening in the morning sunlight, stretched away for miles to the east and to the west and up the slope to the north. Here and there in the high grass that intervened between our perch and the forest edge, 300 yards away, were scattered elephants singly and in groups feeding and loafing along, to be swallowed by the dark shadows of the dense forest side.

SCOUTS IN ACTION

From the gulley which I had started to cross a little time before there stalked 25 or 30 of the great beasts, their bodies shining with a fresh coating of mud and water from the pool where they had drunk and bathed. As is usual with big herds, they had broken up into small bands on entering the forest, and now, as the last of them disappeared into the cover of the trees, a fuller appreciation of the surroundings suddenly dawned upon me. From a mile or more in either direction there came a reverberating roar and crash as the great hordes of monsters ploughed their way through the tangles of vegetation, smashing trees as they quarreled, played, and fed, all regardless of forestry regulations.

Where the little stream at the bottom of the gulley entered the forest, troops of black and white Colobus monkeys were racing about the trees, swearing at the elephants. From the tree tops deeper in the forest two or three troops of chimpanzees yelled and shouted at one another or everything in general, baboons barked, and great hornbills did their best to drown all other noises with their discordant rasping chatter.

IN THE FORESTS OF UGANDA

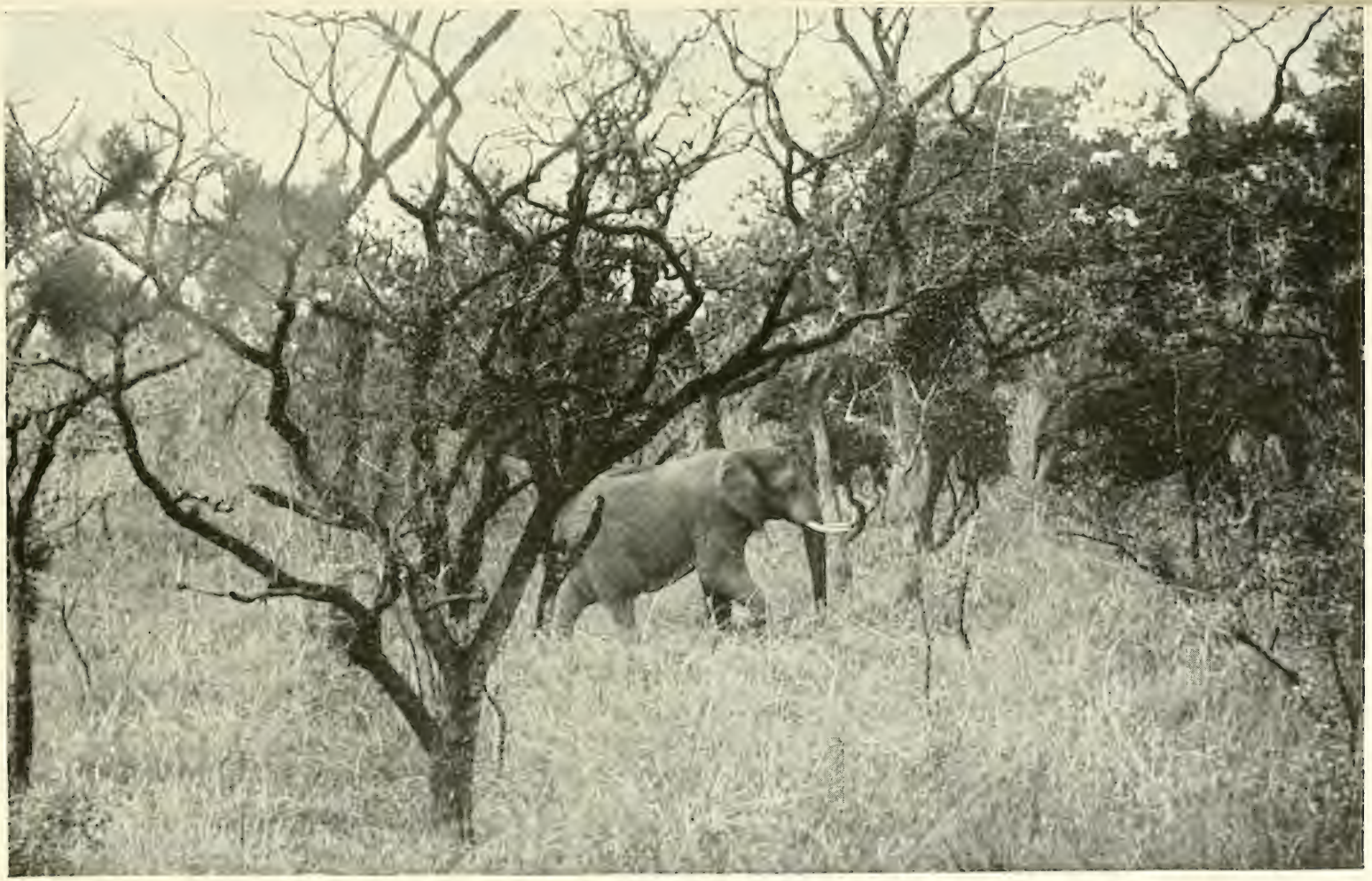
Elephant hunting brings much that is fascinating. Never to be forgotten was that moment when, after hearing the scuffling of great feet among leaves, we came face to face with one of the great beasts in the dim recesses of the jungle. When leaving camp I had said to Mrs. Akeley, in jocular mood, that I would shoot an elephant at 11 o'clock. Remembering this as I came up with a loitering bull in the rear of a herd, I decided to take a photograph showing his small tusks, as an excuse for not shooting as promised. The photograph shows this young elephant, which was about the size of "Jumbo." Encouraged by the result, I continued photographing members of the herd for several hours.

A CHARGING COW ELEPHANT

When approaching this cow from behind we made some slight noise, at which she wheeled and charged at once, paying the death penalty in consequence. The photograph was taken as she started and there was not time to change plates and get the second. The next cut shows the offspring of this cow, a youngster three or four years old and quite able to take care of himself.

A YOUNG ELEPHANT IN TYPICAL ELEPHANT COUNTRY

Offspring of the cow that charged; 3 or 4 years old and quite able to take care of himself. The youngster took some time in deciding whether or not to take the chance of following his mother's example, thus giving an opportunity of securing good photographs



TREKKING THROUGH ELEPHANT COUNTRY

Elephant trails are easy to follow through grass, which shows plainly where the animals trekked in single file (see page 779)

Suddenly a cow elephant at the edge of the forest just in front of us uttered her peculiar shrill scream of warning. Not only the elephants, but all the other forest folk, paid heed and instantly were silent; a moment before the noise had been appalling; the silence now was even more so. Then there came a gentle rustling sound like that of leaves stirred by a breeze, increasing in volume until it sounded like a mighty windstorm in the trees.

I looked about to see whence it came. With my glasses I scoured the forest far and near, but not a visible leaf seemed to stir. Then I realized that the sound was made by elephants on the move, hastening away from danger—the scuffling of their feet among the dry leaves on the ground and the scraping of their sides against the equally dry leaves of the bushes. In a way this was even more impressive than the great din or the death-like silence preceding.

The old cow had caught a whiff of air tainted by man and all obeyed her warning. In a few moments the rustling subsided; the monkeys and birds returned to their normal state. The elephants had evidently settled down without going far; but only at rare intervals during the rest of the day did we hear the squeal of a chastised youngster or the breaking of a tree.

With my gun bearers I went down into the forest. Trails crisscrossed in all directions, so that it was impossible to follow a given trail any distance. A band of a dozen or so got our wind and passed us in confusion at close range, but the bush was so dense that I had but small glimpses of them. A mile into the forest brought us to an irregular clearing, 200 by 500 yards in extent, almost bisected by a "peninsula" of forest.

A WARLIKE MOTHER

At the base of this peninsula I nearly ran against a young bull, one of a considerable number, as I soon discovered. The whole herd began working toward the point of the peninsula and I ran along the outer edge to head them off. Just as the leader emerged from the point, they saw or winded us—shifty, uncertain breezes had sprung up—and they turned back. I ran into the timber to try for a better view of them. I soon found myself facing a cow who, solicitous for her very young calf, had wheeled about, all attention and menacing.

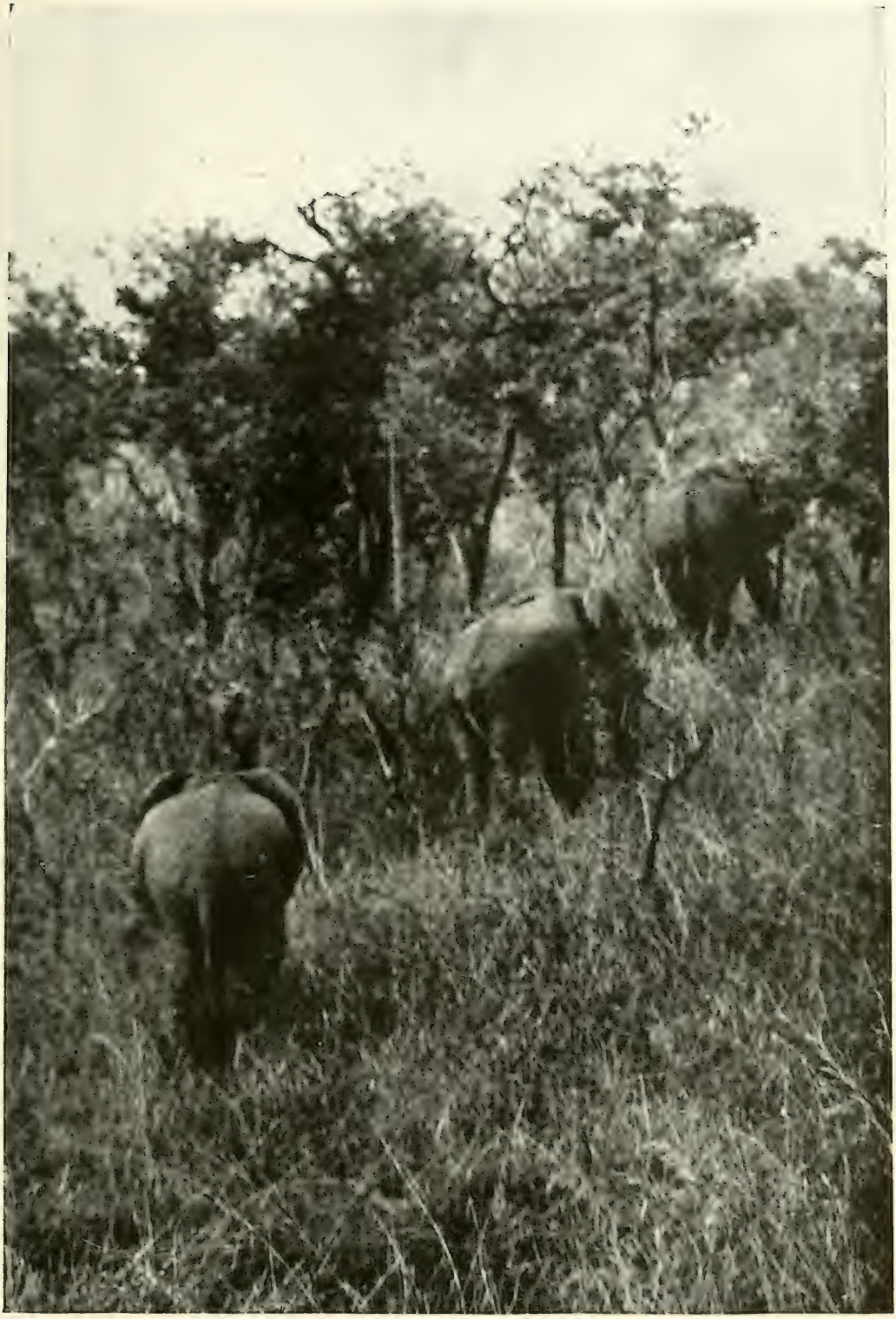
Fortunately, at the moment we were partially screened behind a clump of small trees, and as we remained motionless the cow's fears were soon allayed, and, turning, she gave the calf a boost with her trunk and followed the herd, which was moving off toward the clearing on the other side.

Hurrying out and around the point, I found the herd in the clearing, rounded up in close formation, conscious of the presence of an unseen enemy. There were about 25 elephants, mostly cows, and just as I was on the point of backing off to a safer distance, thinking there were no big bulls in the lot, a fine pair of tusks appeared at the near side. A clump of bushes offered cover for a near approach and I went in quickly to within 20 yards of him, and as his front leg was thrust forward offering a good opportunity for a heart shot, I fired both barrels of the double rifle in quick succession.

RENDERING FIRST AID

All was commotion as I seized my second rifle and, seeing that there was no direct charge, retreated some 50 yards to the top of an ant hill, from which I could see what was going on. I then witnessed a scene such as I had heard described and which I had been keen to verify. A number of cows were clustered about the bull, for he had fallen 30 yards from where he was shot, and with their tusks and trunks were doing their best to get him upon his feet; the remainder of the cows were doing patrol duty, rushing about in an increasing circle, searching for the source of trouble. That meant me, so I retired to a safe distance and waited for the atmosphere to clear.

This bull stood 11 feet 4 inches high at the shoulders, and the tusks weighed 95 and 110 pounds respectively, while the circumference of the front foot around the sole was 67½ inches, the largest recorded, I believe (see photo, page 789).



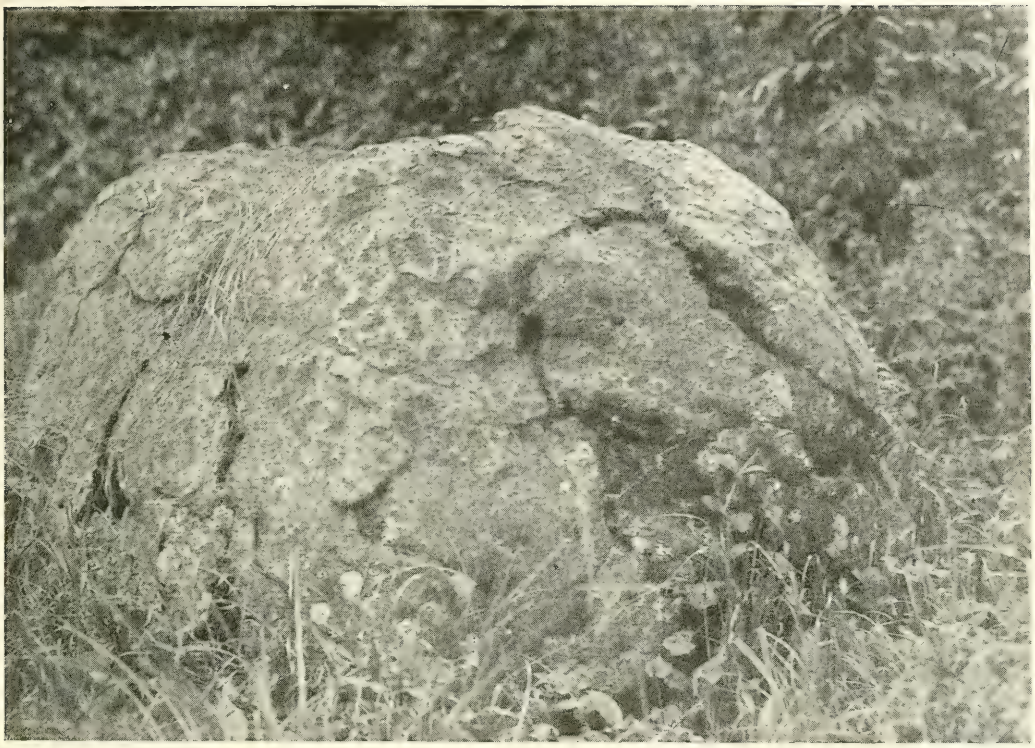
PART OF A HERD OF SEVEN BULLS THAT WE TRACKED ALL DAY ONLY TO FIND THAT THERE WERE NO LARGE-SIZED TUSKERS AMONG THEM

DEVASTATION BY ELEPHANTS

In this garden during the night previous, elephants had destroyed a large plantain grove and broken down fifty or more bark cloth trees averaging a foot in diameter. Elephants come in herds to villages deserted because of sleeping sickness. The damage is usually accomplished by herds containing no large ivory, and which consequently have been unmolested by hunters until they are contemptuous of man (see page 805).

A GREEN ACACIA TREE 15 INCHES IN DIAMETER BROKEN DOWN BY A SINGLE ELEPHANT, STRIPPED OF LEAVES AND SMALL BRANCHES

I have seen a small elephant break a 6-inch tree, not by pulling with trunk or ramming it, but with a side thrust of one tusk, using the trunk only to hold the tree from slipping along the tusk.



BOULDER POLISHED BY THE RUBBING OF GENERATIONS OF ELEPHANTS

The following day I went into the forest again and soon came up with a herd, but in cover so dense that an inspection could not be made. We worked with them for hours, and finally succeeded in driving them out into the open, but unfortunately the grass was high and I had not succeeded in gaining a point of vantage, when with angry grunts they doubled back to the forest.

As I turned to follow, my attention was called to a commotion in the bush at the edge of the forest some 400 yards to the left. Another herd was coming out into the grasslands, and from the top of an ant hill I saw them distinctly as they passed over a rise 50 yards away. There were 11 cows. I waited a few moments, thinking that, as often happens, a bull might follow in their wake. The cows had passed on to a distance of 300 or 400 yards, and I was about to leave the ant hill and return to camp when from the direction of the cows there came a low, ominous rumble like distant thunder. It was not very unlike the angry rumbling sounds we had so frequently heard when with elephants, but it was plain talk and meant trouble.

A hasty glance around convinced us that there was but one thing to do, to stand and meet the charge from the elevation where we were and from which we could see. If we tried to escape to one side or to the forest we could not see them over the high grass before they were upon us.

A LIVING TORNADO

The rumbling was repeated two or three times, increasing in volume, and was then followed by the wild shriek of one angry cow and immediately taken up by 10 others as they charged toward us. They came half way and stopped for a moment. They had lost the wind, but immediately caught it again, and roaring and screaming with redoubled energy came into view over a slight rise. It was a disconcerting spectacle. Their great ears at full spread, trunks thrashing wildly, a roaring, screaming mass, 40

FIGHTING BULLS IN A MAKE-BELIEVE FIGHT

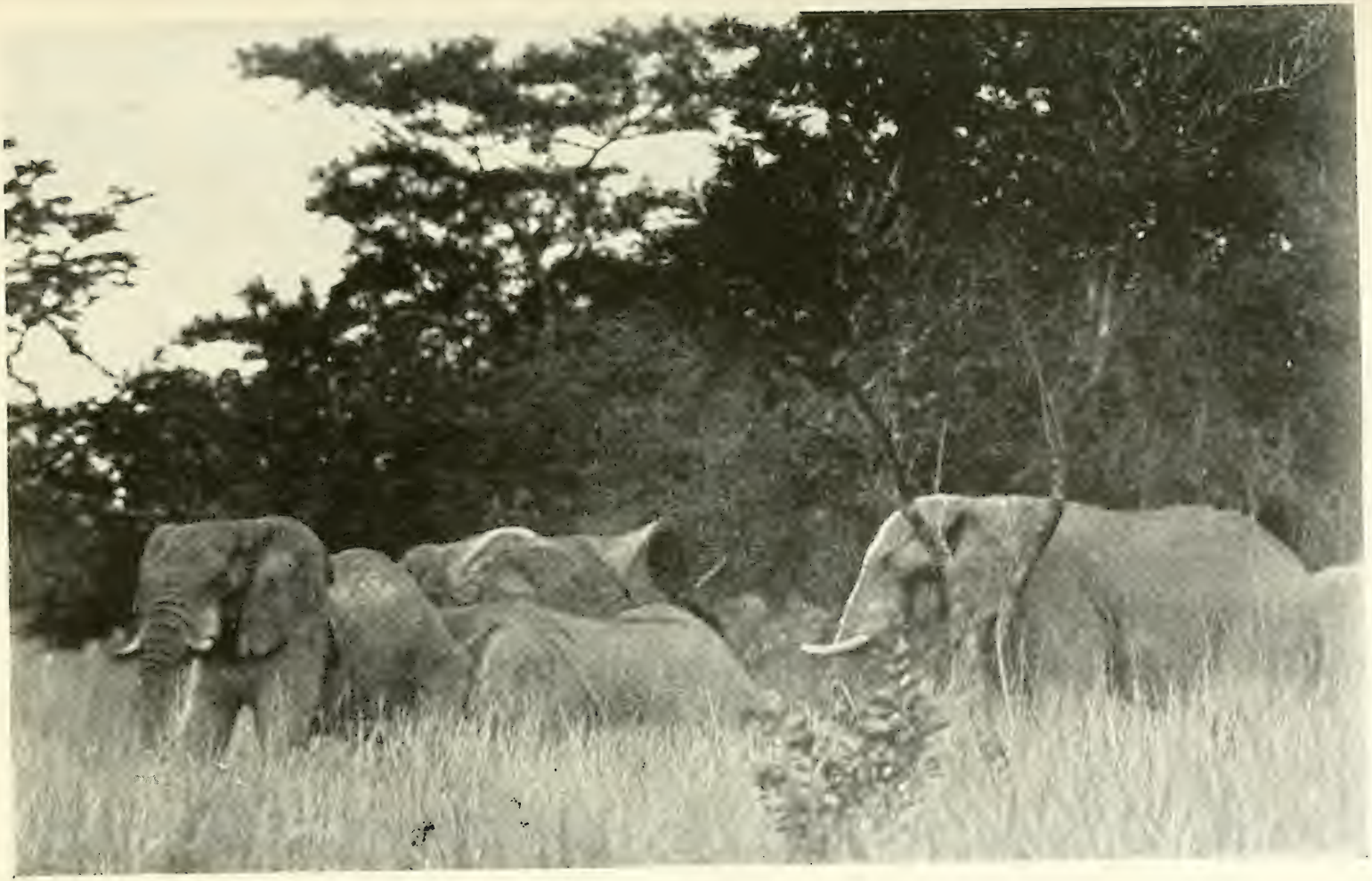
There were elephants on three sides of me when this photograph was taken, which explains the inaccurate focusing of the camera

A LARGE BULL: ONE OF THE HERD OF 700 ELEPHANTS

Height at shoulders, 11 feet 4 inches; circumference of front feet (sole), 77 inches and 77½ inches, the largest recorded. Right tusk (showing in picture) weighed 110 pounds; the left weighed 95 pounds, the lighter weight being due to slower growth because of an injury at the base of the tusk in early life, resulting also in a knotty rib along the entire length of the upper side of tusk. The oldest bulls are those which have long been protected in large herds of aggressive cows and young animals. A number of cows did their best with trunks and tusks to get this fallen companion to his feet (see page 784).

THE PLATEAU TO THE EAST OF MOUNT ELGON

Four herds of elephants are in sight, consisting of cows and young animals of inferior grade. Mr. Akeley inspected more than one hundred elephants in the Mount Elgon district without discovering a single large specimen, all the valuable elephants having been killed off by ivory hunters; the herds remaining, having been unmolested for some years, are unusually vicious in temper (see page 795).

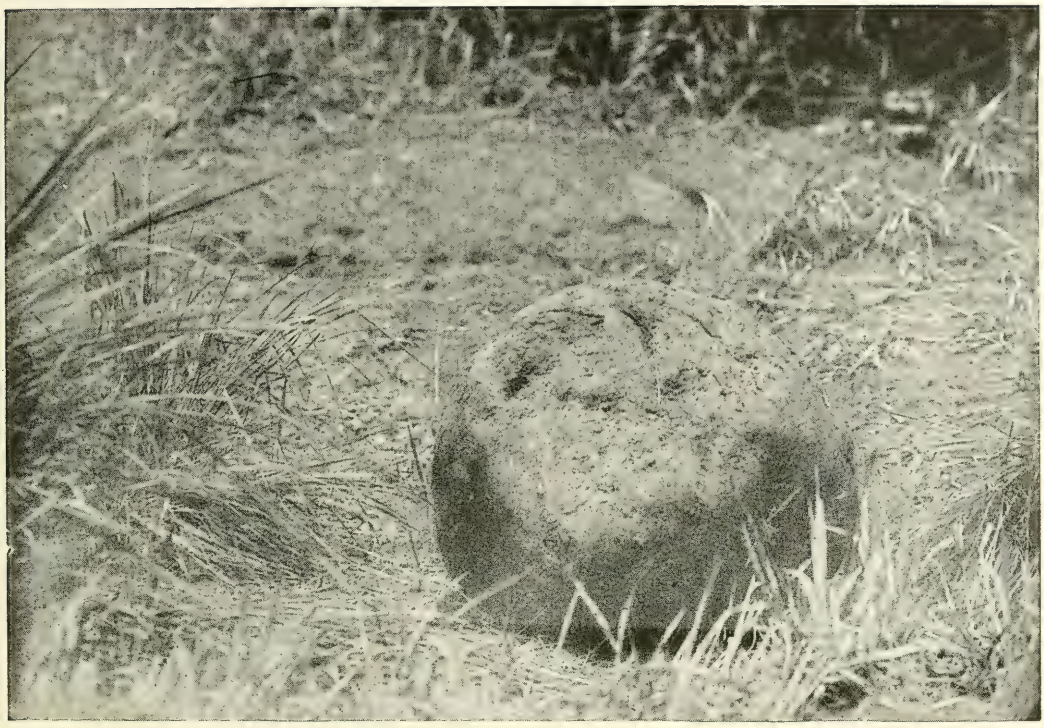


A SMALL HERD WITH ONE YOUNG BULL FACING READY TO CHARGE

"I ran around a clump of bush to head off this band of young bulls, and found myself closer to them than I expected. One of them saw me and I was expecting trouble when the camera clicked, but they bolted and I got a second picture as they turned."

ELEPHANT COWS AND CALVES RESTING IN THE FOREST

They are quietly enjoying the midday siesta. A gust of wind blowing toward them from our direction would be certain to result in a charge. Note the calves crowding their mothers



A BABY ELEPHANT'S MARBLE

A fragment of a termite hill that the elephants had broken off and rolled about on muddy ground until it had become a nearly symmetrical sphere. They had evidently rolled it to this point from a considerable distance, as it was of black earth, while the ground where photographed was yellow. Baby elephants, like most young animals, are fond of a frolic with one another and sometimes at the expense of other animals. One day while inspecting a large herd of elephants that were feeding on the opposite side of a ravine, we met a herd of buffalo in the high grass on our side, and when we succeeded in frightening them off they stampeded across to where the elephants were. Three young elephants left the herd and gave chase, squealing and trumpeting as they charged this way and that, scattering the buffalo, but not driving them away. The buffalo showed no great fear, just keeping out of reach; sometimes a cow whose calf was being hard pressed would face about and make a bluff at standing her ground, but always turned tail when the elephants got too close. As a rule elephants pay slight attention to other animals. Mr. Tarlton has seen a herd of cow elephants beat a lioness out of high grass and chase it into forest cover. This suggests the possibility of lions preying on young elephants, being recognized therefore as an enemy.

tons of frantic female elephant vengeance. I remember that I felt homesick.

Were they to continue in a straight course they would pass at 40 yards; then a dash on our part to one side and we could lose them and be safe. When they were nearly opposite us, however, they either saw or winded us afresh and wheeled straight in, with a burst of shrieks. A shot from the big cordite rifle stopped the leader, but, encouraged by the others, she came on, only to be knocked down by the second shot. The others crowded about her, sniffed and—bolted. The old cow slowly regained her feet and staggered away, while we in deep gratitude returned to camp.

HUNTING FOR UNUSUAL SPECIMENS

It was in August, 1909, that we left New York, commissioned by the American Museum of Natural History to secure specimens for a group of African elephants. We began serious work on the Uasin Gishu Plateau, knowing that there we should be able to secure the smaller specimens, cow and young elephants, and we had reason to hope that a large bull might be found on the plateau

ELEPHANT EMBRYO

Height at shoulders, 10 inches; estimated age, 8 months; that is, one-third of the period of gestation. Except for the slight oversize of head, the proportions are those of an adult elephant.

A MATERNITY BED WHERE A YOUNG ELEPHANT WAS BORN AND CARED FOR DURING THE FIRST WEEK OR TEN DAYS OF ITS LIFE (SEE PAGE 798)

This was found by the expedition while traveling by compass on Mount Kenia, well away from all trails

or in the forests of Mount Elgon, for in former days great numbers had inhabited the rich feeding grounds of the Elgon forest, as evidenced by the old pits (traps), scarred trees, and decaying bones. We inspected more than 100 elephants, however, without finding a trace of a single large specimen.

We journeyed to the summit of Mount Elgon from the south and down to the east without finding the least recent trace of elephants until we had returned to the bush country of the plateau. Then we proceeded to Uganda, secured porters at Entebbe, marched along the Hoima Road to the Kafu River, down the Kafu to where the old Masinde-Kampala Road crosses it, then to Masinde, seeing no elephants during the two weeks' journey (see page 790).

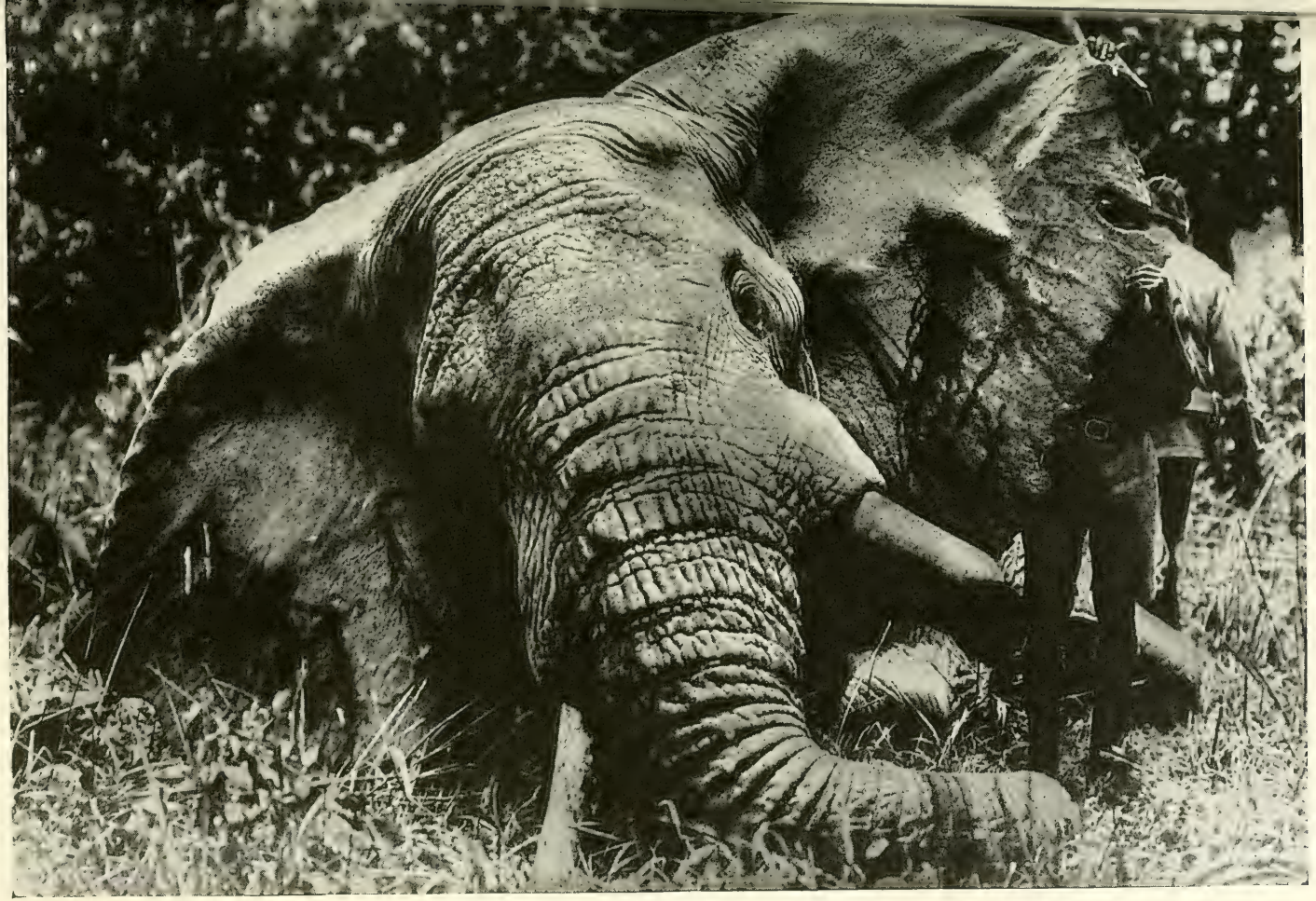
We then devoted a month to hunting in the region of the Victoria Nile between Masinde and Foweira. This is a region of big elephants, where many splendid tuskers have been taken in the past, but really good ones are now very rare. On this occasion we shot two bulls, enormous in size, but with tusks weighing only from 75 to 80 pounds each.

MOUNTAIN-CLIMBING ELEPHANTS

About the middle of April, as I was suffering from physical disabilities that made the preparation of an elephant skin impossible, we decided to return to the Uasin Gishu Plateau, where in the more healthful highlands I might hope for recovery. Though the rains were on at this time, we found no elephants on the plateau, so we devoted 20 days to lion hunting with a party of Nandi warriors for the purpose of making motion-picture records of the spectacular sport of lion spearing. About the middle of May we trekked across country to Mount Ke-

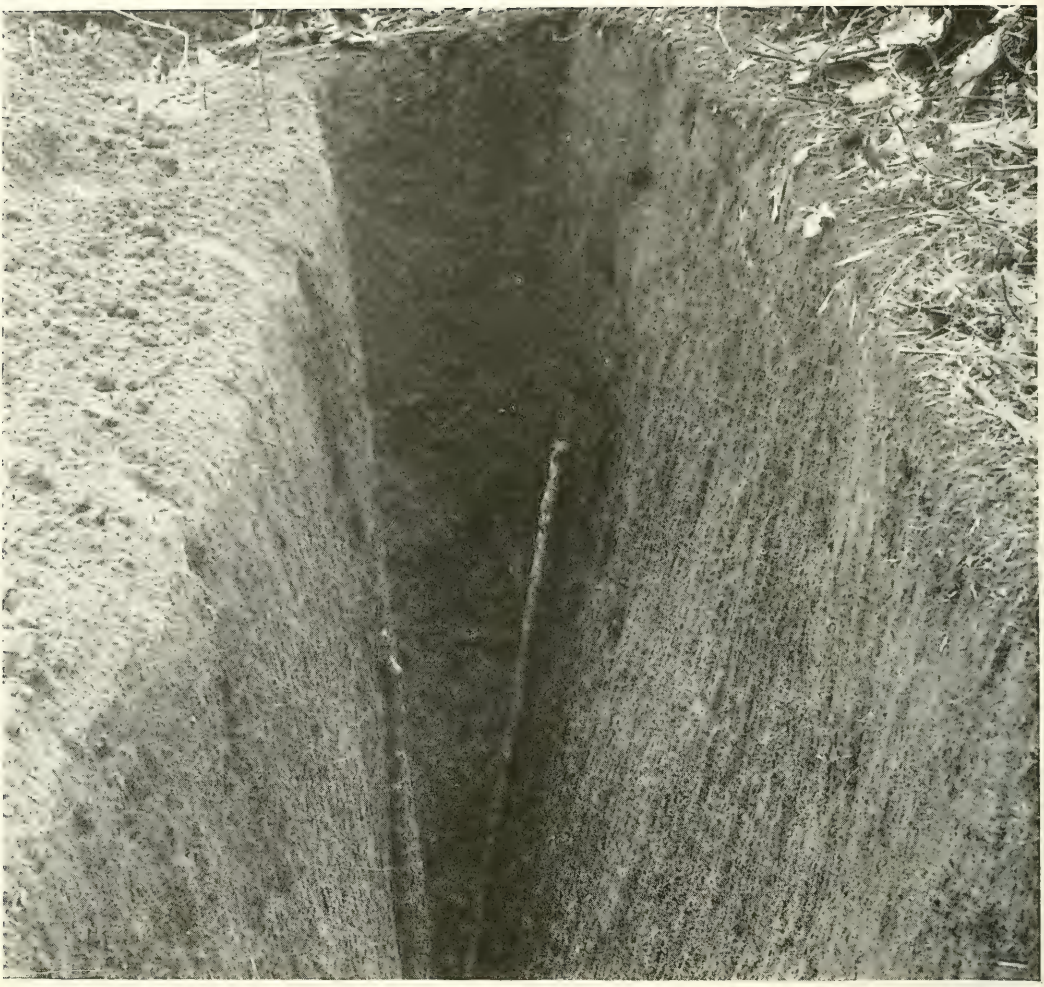
AN OPEN VISTA IN THE BAMBOO JUNGLE OF MOUNT KENIA

The cows and calves spend much of their time in the bamboos feeding on the succulent shoots of young bamboo



THE HUGE EARS OF A BULL ELEPHANT

One of a herd of 8 or 10 bulls. He was first knocked down by a well-placed bullet from Mrs. Akeley's rifle, but he regained his feet, and six bullets failed to stop him as he made off. When we came up with him a half-hour later he got our wind and charged ferociously. Our shots stopped him, but we fired at an angle that necessitated piercing great masses of bone to reach the brain. He charged the third time before a bullet found its way to the brain, just as he had nearly caught one of our boys. An extremely heavy, thick-set bull with short, thick tusks of 80 pounds each. His ears were extremely large, 6 feet 5 inches in depth.



A FRESHLY DUG ELEPHANT PIT

The top will be covered with cross sticks and concealed by earth loosely thrown over the sticks. The unwary elephant crashes through this cover, its great feet are wedged in at the bottom of the pit and it suffers a lingering death. An elephant pit is usually 9 feet deep, is large at the top (3 to 4 feet wide and 10 to 12 feet long), but tapers to a width of only 6 to 12 inches at the bottom. Pits are often made in groups of three, one in the trail and one a few yards at either side.

nia for the purpose of making studies for the setting of the elephant group.

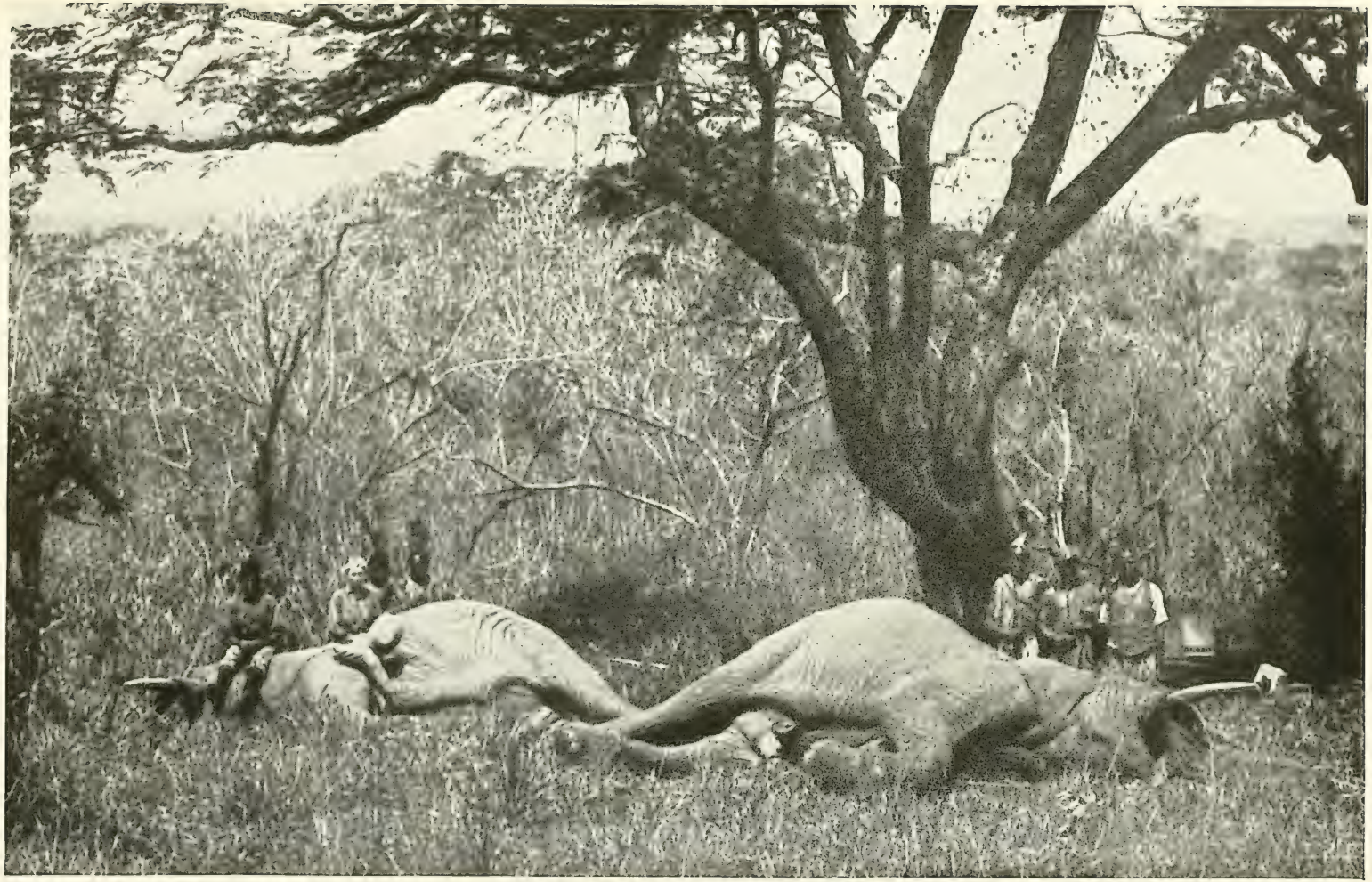
The forests of the southern slopes of Mount Kenia are inhabited by forest elephants, who seldom if ever leave them except to make short night excursions into the gardens of the Wakikuyu natives. Wishing to learn something definite in regard to the limits of their range on the mountain, we made the ascent from the south through the timber and bamboo belts onto the snow fields at the base of the pinnacle. We found that the elephants regularly work up to timberline (12,000 feet), and we found comparatively fresh tracks in the sphagnum marshes at 14,500 or more feet.

THE CRIB OF A BABY ELEPHANT

It was while on this excursion we found the "maternity bed" of an elephant. Under the protection of a great mass of aërial roots and the foliage of a great tree on the point of a densely for-

A COVERED ELEPHANT PIT

The pit has been completed only a few weeks, yet is effectively concealed even to the observing eye by a new growth of vegetation. The pit is a hidden menace to the hunter as well as the elephants. Fortunately they are not usually staked, and a fall into one usually results in nothing more serious than a good shake up. With the elephants it is different. Their great feet wedge in at the bottom of the pit; they become helpless and suffer a lingering death.



NOT A "RIGHT AND LEFT," BUT A "RIGHT AND WRONG"

We had followed a herd of a dozen elephants from morning till midday, when we came up with them as they were enjoying their siesta. There were several young bulls, any one of which would meet our requirements. One was chosen and we, Mrs. Akeley and I, agreed to shoot together to make certain of dropping him where he stood, in the shade of the tree, that we might be protected from the sun while preparing the skin; at the signal we fired [illegible]

A PIT-DIGGER'S SHELTER

The killing of elephants by natives is prohibited; nevertheless the Wandorobo of Kenia were never more active in digging pits than when we were there. When following native guides one does not often run across new pits; it is when traveling by compass, independent of guides, that one is most likely to disturb the trappers at their work. During a three months' stay on Kenia, in 1910, two elephants were killed in pits within a few miles of our camp. A pit may be many years old before an elephant is caught in it, and we were curious to know how the few hunters could watch the hundreds of pits scattered about a large area as they are. The method is simple and entails but little fruitless labor on the part of the natives. A pitted elephant may live some days before death comes to its relief, and then a signal is soon wafted down wind to which the hyenas and leopards promptly respond, the hyenas howling as they go in search of the feast, and the Wandorobo follow the howls and tracks of the other carrion feeders. The flesh of the elephant is thoroughly ripened by the time the natives reach it.

ested ridge, accessible from only one direction, there was a deeply trodden bed of dry earth, where the baby elephant had been born and had spent the first week or ten days of its life, while the mother watched over it or fed on the abundant vegetation near at hand. Later we found a second bed precisely similar as to situation. These beds were well off the lines of elephant travel (see picture, page 795).

Upon returning from the summit of Kenia to the native gardens at the edge of the forest, I went back again to the bamboos to make photographic studies for the background and gather materials for accessories for the group. While thus engaged I met a bull elephant, which left me much the worse for the experience and necessitated my return to the base camp on a stretcher. This event postponed work for several months, and

WHEN AN ELEPHANT IS KILLED THE NATIVES CONGREGATE IN GREAT NUMBERS, GOING INTO CAMP ABOUT THE KILL, WHERE THEY SMOKE-CURE THE FLESH

Not a bit is allowed to go to waste. Note the pieces of flesh hanging in the foreground

THERE ARE FEW TREES IN THE ELEPHANT COUNTRY THAT DO NOT SHOW THE SCARS OF WOUNDS FROM ELEPHANT TUSKS, AND THOSE BESIDE THE TRAILS ARE KEPT WELL POLISHED BY THE RUBBING OF PASSING HERDS

GUN-BEARER MARKING ELEPHANT RUBBING ON THE TREE

This man, a Swahili, was gun-bearer for Mr. Arthur Newman at the time he was nearly killed by a cow elephant on Kenia. One lung was punctured by the elephant's tusk, and the gun-bearer is reported to have killed the elephant, saving Mr. Newman's life. When a similar accident happened to me this gun-bearer ran to safety.

A TREE HALF DECAYED BECAUSE OF TUSK WOUNDS THAT NOW SUPPLIES THE ELEPHANTS WITH DRY PUNKY WOOD WITH WHICH TO DUST THEMSELVES

it was not until January, 1911, that we resumed active work in the field. From then until the first of June we worked in Unyoro, from the Victoria Nile on the east and north to Lake Albert on the west northward of Masinde.

This district has now been closed because of sleeping sickness, and thus becomes an elephant reserve. During the time we were there we saw much of the results of this awful disease, whole villages in which not a living being was to be found, those who had escaped alive having abandoned all household utensils and stored food, together with the huts and gardens, to the mercy of the elephants, who had come in great herds, destroyed the plantain groves and bark-cloth trees, completing the work of devastation.

The elephants do not always by any means wait for the natives to go. We saw many cases where they had raided a garden at night and completely destroyed all crops, and in some instances, when angered by the natives' attempts to drive them away, had destroyed the huts also.

THE DESTRUCTIVENESS OF A HERD

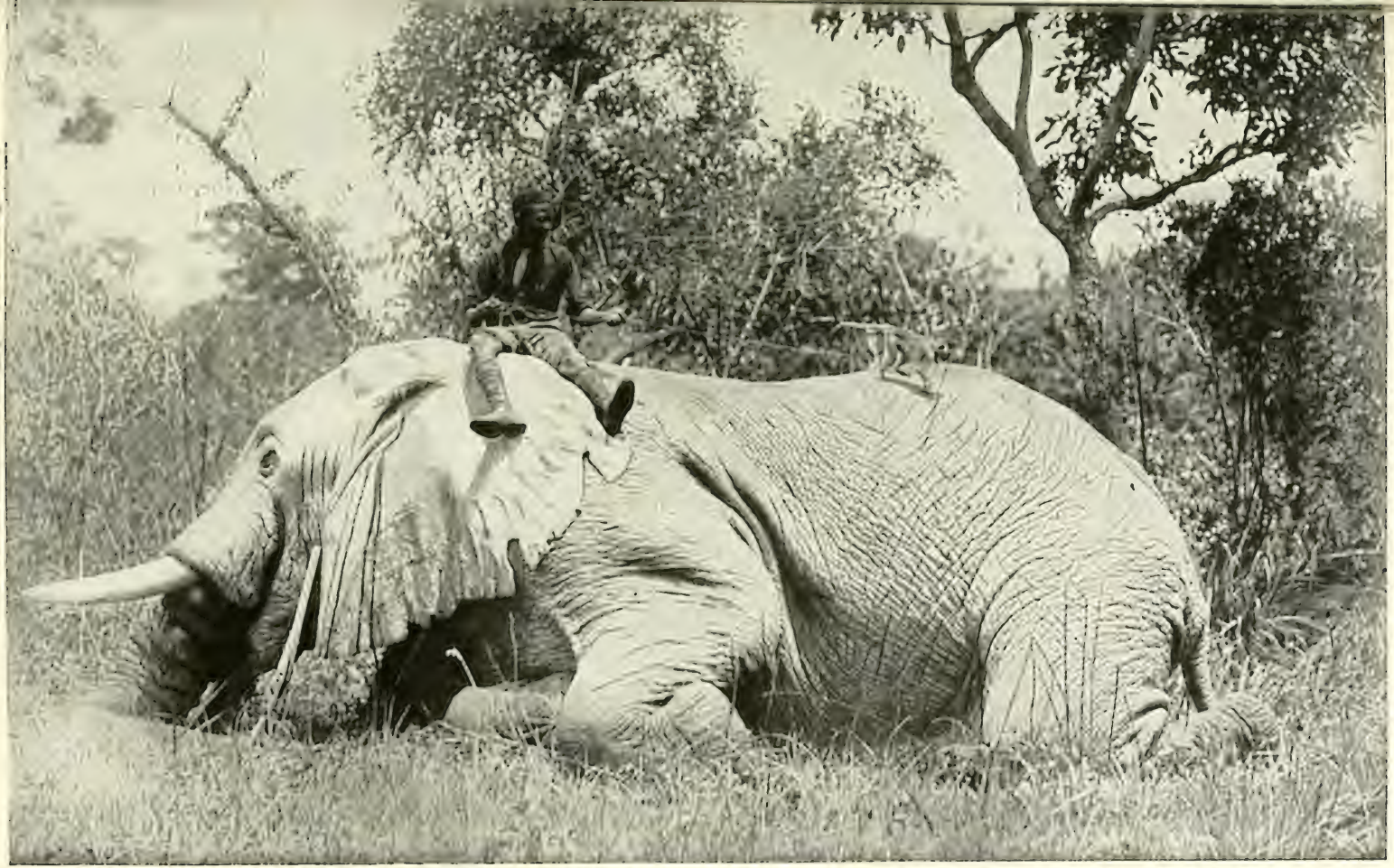
The amount of damage that a herd of 500 elephants can do to forests and native cultivation is enormous. In following a herd of 250 we were led through a garden, where the night previous elephants had destroyed a large plantain grove and broken down 50 or more bark-cloth trees, averaging a foot in diameter. This was a herd from which all good bulls had been killed and the remainder, enjoying immunity from sportsmen and ivory hunters, had become contemptuous of man (see page 786).

When we approached the herd and they became aware of our presence, they surged down upon us, keeping us at a distance, and not until I climbed a tree in advance of them did I get a chance to look them over as they approached and

MOSS-COVERED ELEPHANT SKULL IN THE BAMBOOS NEAR TIMBER LINE ON MT. KENIA

passed. The average value of ivory in this herd would not have exceeded $20 per head, not enough to cover the damage done by them in one year.

Coming south from the neighborhood of Murchison Falls, we were resting at the summit of the pass over Poduro Hills, when we detected a herd of about 100 elephants at rest some 2 miles to the south. As we watched them they began moving in our direction and ultimately reached the base of the hills, where we met them. In the meantime a second herd of more than 100 appeared, traveling rapidly to the north, passing within easy inspection range of our outlook. During the time we were engaged in watching these elephants the middle ground was occupied by two herds of buffaloes, and as we went down to look the elephants over at the foot of the hills we jumped the third herd of buffaloes in



THE BIG FELLOW WHO NEARLY FINISHED "J. T. JUNIOR"

"At the third desperate charge of the huge beast, and just as he was almost upon the tent boy, who was carrying J. T. Junior, a lucky shot brought him down. It took some time for the monkey to screw up courage to go on an exploring expedition over the body of his late enemy." The monkey, named "J. T. Junior," was captured on the Tana River in the first month of the expedition's travels and remained a member of the party throughout the two years—often the most helpful member in the good cheer he furnished. In the climb of Mount Kenia he was stricken with mountain sickness at 15,000 feet elevation and had to be sent back.

MRS. AKELEY WITH THE TUSKS OF HER TWO MOUNT KENIA ELEPHANTS
The combined weight of the four tusks was over 400 pounds, a record

IVORY CARAVAN

A caravan with 97 tusks from the Haut Fturi. The largest weighs 106 pounds and is 9 feet long. Trade in the Congo is now in the hands of several nationalities

the bamboos. There were over three hundred in all.

It is generally understood that large bull elephants are more frequently to be found apart from the herds, but our experience does not bear this out. Three bulls that we have shot, having tusks each weighing 100 pounds or over, have been herd bulls. In Uganda we often found bulls unaccompanied by cows, singly and in small herds numbering up to 15 individuals, but it was not among these that we found the largest tusks. We have found the large old bulls enjoying the society and protection of large herds of cows and young animals (see page 789).

A GUARD OF HONOR

One splendid old bull well known in Uganda, who has been seen by many hunters, is so well protected by a large herd of most aggressive cows, who charge at the slightest intimation of danger, that he still survives. These old bulls are very rare, for when a bull has developed tusks of 50 pounds, which is at quite an early age, perhaps 25 years, he becomes the target of every hunter, native or white, who sets eyes upon him; thus it is only the more crafty or timid individuals that, seeking the protection of large herds or clinging to the more inaccessible regions, such as dense forests, manage to survive to a ripe old age and develop a full growth of ivory.

The best bull at present in our collection for the group is a young adult standing 11 feet 3 inches at the shoulders with tusks of 100 and 102 pounds respectively. These are young ivory, and there can be no doubt that were this elephant to have lived 50 years longer they would have attained a weight of 200 pounds each. Such tusks are not abnormal; they are simply the tusks of a good, healthy bull who has been intelligent and lucky enough to keep his life until his ivory was full grown.

It would seem worth while that the world's permanent record of elephant life should contain a specimen that illustrates the fullest development of the African species, the finest living representative of this race of animals. Such an elephant can be secured now, but it will soon be too late, for the remaining monster specimens will be killed for their ivory.

ZANZIBAR

By Mrs. Harris R. Childs (Eleanor Stuart)

HUNDREDS of tourists and government employees, on the manifold errands of empire, see the town of Zanzibar without knowing much of it, or ever exploring beyond the German or English tennis clubs. But this is less remarkable than the fact that merchants, priests, secular missionaries, military and diplomatic whatnot, Indians, Arabs, Parsis, and Europeans (as inconspicuous artisans or petty traders) actually live in the town year in and year out without so much as walking half a mile beyond the terminus of the little American railway at Bu-bu-bu, a village a few miles from the town itself. The precedent for this neglect—and the social fabric of Zanzibar is dependent on precedent—is undoubtedly the indifference of the early explorers, who fitted out caravans in the old town; and, bent on discovering a volcano or a nyanza far afield, never wasted time in wandering about the glorious island itself.

On the first day that one leaves the road behind and finds oneself at large in the dense green of Zanzibar's titantic verdure one is conscious of a newness of interest as when one reads for the first time some book of very distinctive imaginative quality.

The woods and fields, the "shambas" (plantations), are like the contents of a Brobdignagian glass house; the colors of flowers and trees themselves are so elementary as to seem like a child's concept of beauty in nature, and when, unexpectedly, without preparation of any kind, the sight of the clove trees, shining green, red-stemmed, symmetrical, stretches before one, with the ultramarine of the Indian Ocean as a background for their

unequaled loveliness, the beauty of the whole writes itself on the memory of the most commonplace of observers as an indelible delight.

The island, about the same size in square miles as Long Island, is of a different shape, being shorter and much broader. It is one of Great Britain's protectorates, but Sayyid Ali bin Hamoud, its present Sultan, has political instinct and a spirit of progress. Since his accession he has materially bettered his position and exalted his dominion in European as well as British eyes.

To the south of the town the landscape is less redundant and riotous in vegetable expression, but goats abound, and find all they need in the way of food to make them marketable.

A TROPICAL PARADISE

But to the north the mango trees, palms, cloves, and every form of orange and lemon crowd thick and glorious under the most primitive of husbandmen. Just as Africa itself is netted over with aimless footpaths, so is Zanzibar veined with little tracks worn deep into the living green so long ago that no tradition follows the feet of those who made them. That black, furtive, futile being whose American enfranchisement convulsed the United States still stands there at the door of his hand-hewn hut like a creature potentially human, but lovable beyond belief in these appropriate surroundings, knowing himself to be but 15 minutes out of the jungle, and as one once said to the writer, who was endeavoring to tell him of the civil war, "happier when he lives near to the leopard and the trail of the things that eat and are eaten than when the shadow of a master's hand is always on his shoulder."

THE OLD SLAVE TRADE

The industrial life of Zanzibar has changed three times since David Livingstone cried for mercy for the black man, who sorely needed it. Under the Arabs the town was a slave center, where the poor creatures, who were caught in the course of one of Tippoo Tib's "war walks" into the interior, were brought to the island carrying ivory, and prepared by various heavy-handed methods for service as slaves in the Persian Gulf or in the shambas and warehouses of Zanzibar itself. The Arabs achieved the best negroes imaginable, whatever their methods may have been, and when England ruined Tippoo Tib by her slave regulations ivory took the place of slaves as a trade staple, and dealers from hither and yon brought their ivory for sale to the quaint Arab town, whose sanitation was then a by-word of the East.

The bodies of dead slaves were frequently put out on the beach by Arabs too inhuman to give them burial, and animals who had died were disposed of in the same fashion. Bath water was informally evicted through harem windows, and all the wanton waste of the cooking department in large Arab houses was banked up by the kitchen doors. There is a tendency to that sort of thing still, but Dr. Spurrier, Zanzibar's health officer, untrained as a sanitary engineer, but essentially scientific and resourceful, has removed Sir Richard Burton's reproachfully apt epithet of filthy in connection with Zanzibar town.

THE CLOVE INDUSTRY A SALVATION

But the third and last phase of industry in Zanzibar has been its salvation, and will keep it alive as a place of importance long after Mombasa has caught up with and passed it as the center for general trade and the entrepôt for the African Hinterland. This last phase is clove cultivation, and the history of the clove in Zanzibar is a record of such pluck and foresight as may well teach a lesson to the proud Saxon who considers his race a monopolist of both qualities.

In 1860 an Arab named Telim bin Isse came up from Mauritius with a handful of cloves in his pockets and 200 plants to put into his shamba. His idea of agriculture was very unique, and he only intended to persevere in clove culture if he could depend on a crop after every neglect and affront had been offered his trees. Their beauty (cloves are a kind of myrtle and exquisite in appearance) excited the interest of Said Burgash, about to become Zanzibar's Sultan, and

A FORTUNE IN IVORY. EACH TUSK WORTH $50 TO $100: ZANZIBAR

FIREPROOF VAULT FOR STORAGE OF IVORY: ZANZIBAR

There are 967 tusks in the picture, weighing 58,000 pounds. One of the most remarkable ivory pictures ever taken. Note the addresses stenciled on the uncovered tusks

he wrote at once to the Moluccas to obtain the finest plants which could be bought for money.

Two Dutch ships brought them in an unusually short time, and the Sultan, the most remarkable man Zanzibar has ever produced or associated with its fortunes, sent out numbers of his henchmen to compel laborers from every side to get the plants into the soil immediately. He had read up the whole subject in a book of French authorship, which he had caused to be written out in Arabic, and saw that the enterprise had a great mercantile future for Zanzibar. He knew that the island's supremacy as a trade center would pass, and he hoped to make it with Pemba, the extremely fertile but rather uninteresting island to Zanzibar's north, paramount in the world of spices.

In 1872 a cyclone blew over Zanzibar, which uprooted all the clove trees and blew the cocoanuts flat to the earth without breaking them. Many clove trees were blown into the sea; many were broken off short. Within a week after the storm Said Burgash was rounding up his laborers again and sending hither and yon for plants, which he presented to the poorer Arabs, who had seized on the idea of a crop which could be sold to Europeans, and had put their all into the purchase of plants and slaves for their culture.

THE WORLD'S SUPPLY

From that second planting comes nine-tenths of the world's clove supply today, and when one realizes that the least output of cloves per annum has amounted (from Zanzibar alone) to 80,000 bales and the greatest output to 200,000, and when one furthermore realizes that the government claims as tax one bag out of each five, one may catch a vista of Burgash's dream, and concede that even the Oriental has in part the greatest of mental attributes—imagination.

One might write a book on Zanzibar, and in the hurry of its beauties and the horrors of its mysterious catastrophes, like the smallpox epidemic or the bubonic plague, forget to tell the half of its wonders. It will always remain in one's mind like a soiled page of the Arabian Nights, with what promised to be a splendid outcome ruined by some fearful visitation of cyclone or of sickness. But the intrinsic strength of the island continues in the clove crop and has attracted an enormous quantity of Indians, who are fast driving out the Arab and keeping up a desultory intercourse with India for caste reasons. The penalty for visiting Zanzibar is the lightest inflicted on any Indian who travels; he is merely required to wash in the Ganges, so that emigration to Africa's east coast is virtually encouraged.

THE MELTING POT

To realize Zanzibar's cosmopolitan quality one must reflect that with the exception of a handful of the Wa-Hadimu, or original people (Bantu) of Zanzibar, no one lives there for any reason except greed of gain or acquiescence to coercion. The Swahili boys are a compromise between the Arab masters and their savage women. One sees Nyassa children black and glossy as lumps of coal, pointing at a distinguished old Arab as their father, or slim young Galla boys, leaning in their coffee-colored perfection over lakes crammed with blue water lilies, claiming kin with an Indian as a parent on one side of the house and a slim Somali on the other. Mohammedanism knits them together in its strong embrace, while only the Indian women secured in the Zenana system remain quite unchanged by travel and the different mode of life which a new country affords.

Much good ivory still comes to Zanzibar, but the world's supply lessens yearly, while the demand for it increases month by month. The best ivory in the world comes from Benadir coast (Italian Somaliland), and as a return American cotton and oil find their way to the Benadir ports—Mogdesho, Barawa, and Merker. For four months of each year these ports are closed, and the "dhows," or sailing ships, which take up case oil and cotton cargo from Zanzibar, together with flour, sugar, and candles, stand stacked in Zanzibar's harbor, waiting for a wind from the north again to promise safety on that sandy treacherous shore of Benadir.

EXTREMES MEET. THIS PICTURE ILLUSTRATES THE WIDE VARIETY IN TUSKS. THE LARGE ONE MEASURES 9 FEET ON THE OUTSIDE CURVE

A MESSAGE FROM PEMBA SPED IN A NATIVE CATAMARAN

ZANZIBAR'S MAIN STREET, WHERE EACH OF ITS 160,000 INHABITANTS WISHES TO PASS DAILY

PICKING CLOVES IN ZANZIBAR

The average height of a clove tree (*Caryophyllus aromaticus*) is 26 feet. The natives speak of them with enthusiasm as "towers of green"

A PLANTATION NEAR ZANZIBAR

UNLOADING A BRITISH STEAMER AT ZANZIBAR

NATIVE MARKET: A COMMENTARY ON ZANZIBAR'S CONSUMPTION OF BANANAS

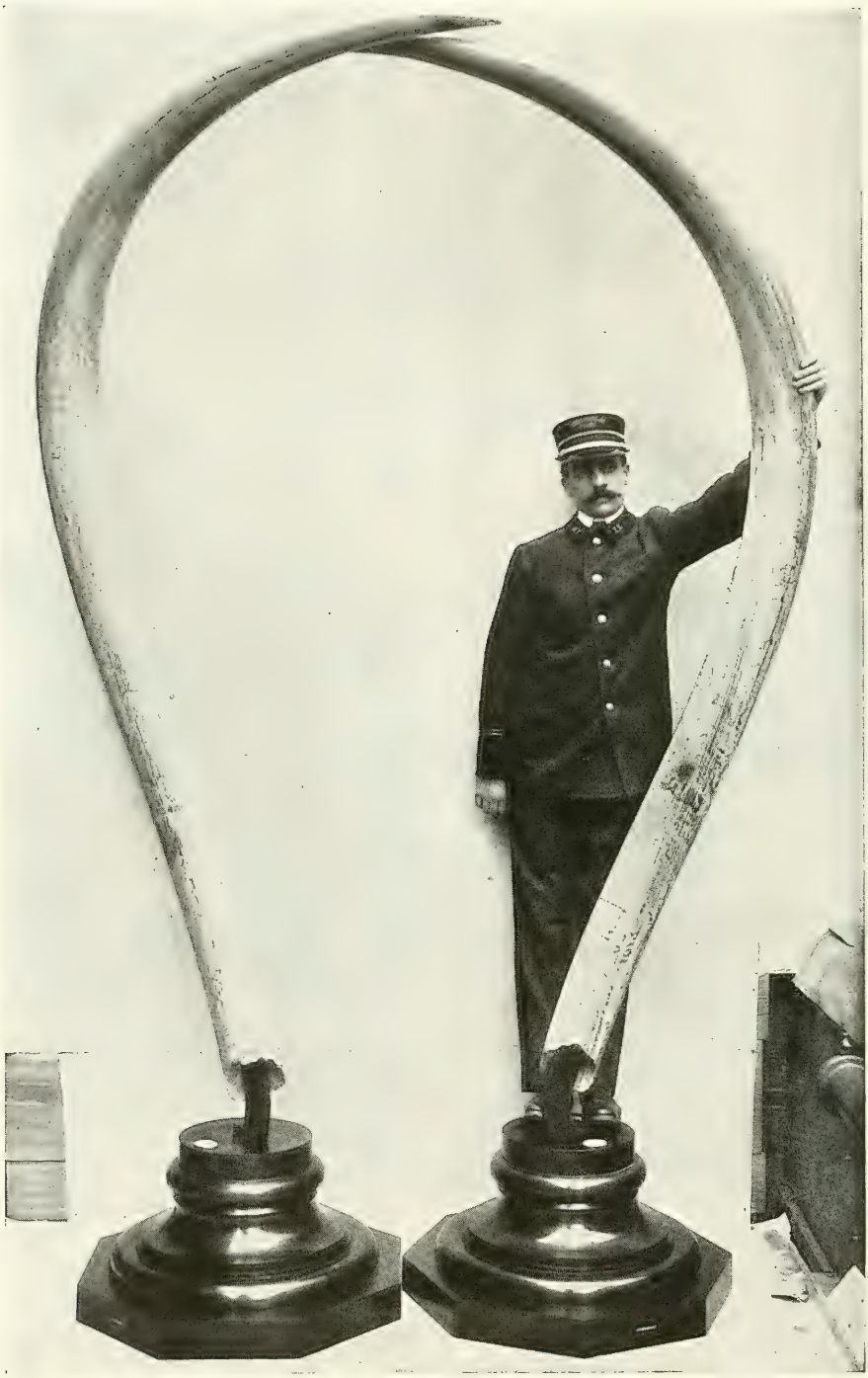


Photo by courtesy of the New York Zoological Park

PROBABLY THE MOST SYMMETRICAL ELEPHANT TUSKS IN THE WORLD

THE TWO LARGEST TUSKS IN THE WORLD; NOW IN THE BRITISH MUSEUM. A TYPICAL ARAB DOOR AT ZANZIBAR, SHOWING THE DELICATE CARVING

INSECT LIFE

The fauna of Zanzibar is meager. In 1873 an hippopotamus dropped in from German East Africa! and whatever exists in the way of wild cat or pig to the north of the island is quite as continental in origin. On a small and neighboring island a very peculiar rodent exists, for which I have never heard even a native name. But the insects of Zanzibar, although rarely venomous, possess a variety that is as extraordinary as their activity. There is the "breaker of saucepans," a green thing, terrible to behold, and an army of ants, in different regimentals, the mosquito in its more harmless phase, and an occasional centipede.

The house-fly is almost unknown.

Zanzibar is perhaps the most interesting town to the negro that the world affords; plenty of old slaves, who haven't seen it for 20 years, dream ceaselessly of it, when a 12-mile walk would bring them to its market-place. And we, who have known European kindness and African quaintness within its far-away borders, turn to our memories of it after months of absence and acknowledge it to be a place of happy dreams.

VOLCANOES OF ALASKA

DURING the first week in June Katmai Volcano, in southwestern Alaska, which had been generally believed to be an extinct volcano, unexpectedly burst into violent eruption and continued active for three days. Vast quantities of dust, pumice, and stones were ejected aloft. So dense was the cloud cast into the heavens that the people in the village of Kadiak, about 100 miles distant, were in total darkness for two days. All the crops on Kadiak Island were destroyed by the ashes; the fish in the sea and in the rivers were killed and all water supplies were poisoned. Through the courtesy of two members of the National Geographic Society, Capt.-Commandant E. P. Bertholf, U. S. R. S., and Mr. W. J. Erskine, of Kadiak, this Magazine publishes a very unusual series of views of the remarkable fall of dust and ashes after the eruption of Mt. Katmai. As all the photographs were taken at least 100 miles from the volcano, the reader can infer the tremendous nature of the cataclysm which could deposit such enormous quantities of dust and ashes so far away.

In the pictures Kadiak and vicinity appear wrapped in a mantle of snow, but the white covering in reality is the white volcanic dust. At the time of year the photographs were taken this region is always as green in vegetation and foliage as any part of the United States. All the land was covered with grasses, plants, and shrubs, whose luxuriant green is buried under the heavy fall of ashes, and a beautiful landscape changed to a scene of desolation.

EXTRACT FROM REPORT OF CAPT. K. W. PERRY, U. S. R. S., ON BOARD THE REVENUE CUTTER "MANNING"

On June 6, 1912, the U. S. R. S. steamer *Manning* lay moored at the wharf at St. Paul, Kadiak Island, taking coal. About 4 p. m., while standing on the dock, I observed a peculiar-looking cloud slowly rising to the southward and westward, and remarked to a friend that it looked like snow. Later distant thunder was heard, and about 5 p. m. I noticed light particles of ashes falling. At 6 o'clock the ashes fell in considerable showers, these gradually increasing. The cloud bank had spread past the zenith when I observed another bank to the northward, and the two met about 30 degrees above the northern and eastern horizon. Thunder and lightning had become frequent at 7 o'clock, very intense at times, and though lacking two hours of sunset a black night had settled down. It was impossible, owing to electrical conditions, to use the wireless apparatus; consequently no information could be sent out. This was also found to be true of the Woody Island naval wireless station. Specimens of the deposit were

FRAME STRUCTURE CRUSHED BY WEIGHT OF ASHES

taken at various times and it was found to consist of dust and fine sand or granules. At 12 midnight the thunder and lightning diminished, but it continued intermittently until the storm (if this term may be used) ceased, on June 8.

The morning of the 7th dawned with volcanic matter falling, and it continued, although gradually diminishing until 9.10 a. m., when it ceased. We then believed that the eruption was over. All of this time no one knew where the eruption had occurred, for, owing to the excessive static, no work could be done by the wireless. About five inches of ashes had formed, and all streams and wells were fouled and choked, so water was furnished the inhabitants of St. Paul by the *Manning* and by the schooner *Metha Nelson,* anchored near by.

At noon ashes commenced to fall again, steadily increasing in density until at 1 p. m. it was impossible to see beyond a distance of 50 feet. At 2 p. m. pitch darkness had set in, heavily static disturbances were observed, and our wireless was dumb. All ashes of the previous day had been removed, yet decks, masts, and yards were again heavily laden, as were also the ship's boats. The ashes now were fine dust and flakes of a yellowish color. Sulphurous fumes were at times in the air, and many thought and spoke of the destruction of Pompeii. Avalanches of ashes on the neighboring hills could be heard, and these sent forth clouds of suffocating dust. Men often collided in working about the decks, the feeble glow of the electric lights and lanterns failing to dispel the awful darkness. The crew kept constantly at work with shovels, and streams of water from the fire mains were playing incessantly on the deck in what at times seemed a vain effort to clear the ship of its deadly burden. The bells of the Greek church in the near-by village boomed out in the blackness, and there were few if any of its followers who did not grope their way to the call to prayer. I might state at this point that I believe the catastrophe appeared more terrible at St. Paul than at the near-by settlements, because of the suffocating clouds of volcanic débris that swept down from the hills close to the town, adding to the fall from above.

At 10 a. m. the people of the village had sought shelter in the warehouse on the wharf and on the *Manning*—about 835 souls—and others were added later from vessels, the salmon cannery, and the people of Woody Island.

Shortly before 11 a. m. Lieut. W. K. Thompson, of the *Manning,* informed me that several men were cut off in the cannery about one-half mile distant below our dock. He stated that he had a

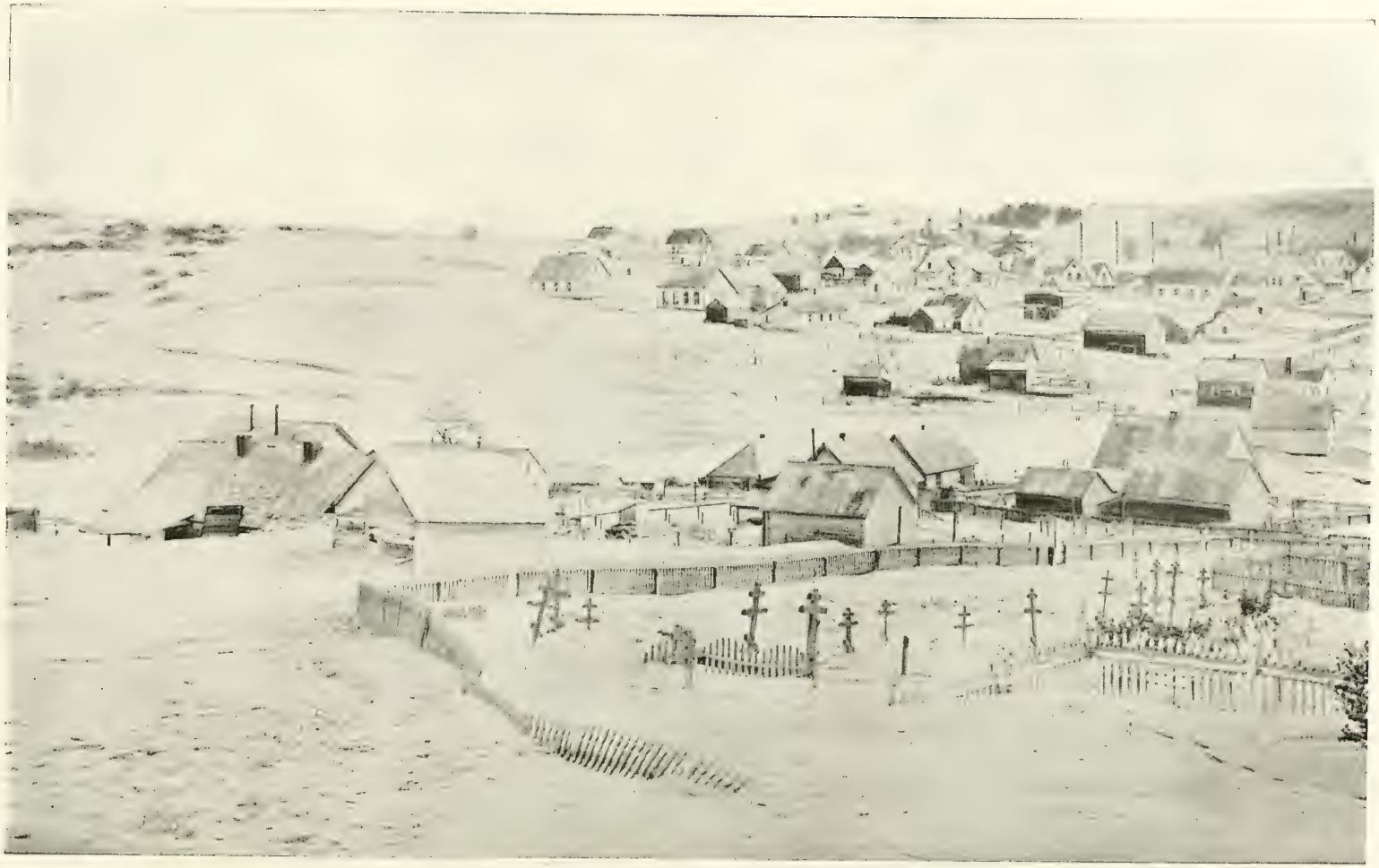


Photo by W. J. Erskine

VIEW OF KADIAK, SHOWING VOLCANIC ASH

The depth in the foreground is about 12 feet. The lake in the center of the picture is completely filled. June 14, 1912

ON THE "MANNING'S" BRIDGE

The decks of the *Manning* were repeatedly cleared of dust and ashes, but a few hours would bring about the same condition. Note the effect of drifted snow.

Photo by W. J. Erskine

THE A. C. COMPANY DWELLING-HOUSE AT KADIAK

Porch broken down from weight of ashes. The deposit here was 24 inches thick on the level. June 14, 1912

Photo by W. J. Erskine

RESIDENCE AT KADIAK MADE UNINHABITABLE BY THE FALL OF ASHES

A slide wrecked the rear of this house and the living rooms drifted half full. Note the line showing the level of the ashes in the window to the left. June 14, 1912

Photo by Lieut. J. F. Hahn, U. S. R. S.

THE DOCK AT ST. PAUL, ON KADIAK ISLAND, SHOWING THE HEAVY FALL OF ASHES

Photo by W. J. Erskine

ON BOARD THE "METHA NELSON" AT KADIAK

Ashes were still falling slightly when this was taken. The deposit here shown nearly all fell the last day of the disturbance; the fall of the first day had been fairly well cleared off. June 9, 1912

HOUSE AT KADIAK RUINED BY AVALANCHE OF ASHES FROM HILLSIDE

Weight of ashes from hillside avalanche crushed in roof and almost filled the interior of this house. St. Paul, Kadiak, June 9, 1912

Photo by W. J. Erskine

SHOWING ROOF OF FISH HOUSE AT KADIAK BROKEN DOWN FROM WEIGHT OF ASHES. JUNE 14, 1912

Photo by Lieut. J. F. Hahn, U. S. R. S.

VOLCANIC DUST 2 FEET DEEP: SCENE AT KADIAK AFTER THE ERUPTION OF KATMAI VOLCANO

party willing to try a rescue and asked for orders. I replied that I dared not give him orders, for it might be sending men to death, but that he and his party had my permission to make the attempt. The party at once decided to go, departing at 11 o'clock, and returned on board with the rescued men at 1.30 p. m. It was an heroic act deserving of highest commendation.

At 2.30 p. m., June 8, the fall of ashes decreased, the skies assumed a reddish color, and finally objects became dimly visible. All clothed and festooned in ashes, nothing looked familiar, and as frequent seismic disturbances were still felt, much fear existed that worse was still to come.

The night of the 8th was spent in suspense, but when the morning of the 9th dawned and all precipitation of ashes had ceased, it was felt that the eruption was over. Some time during the eruption the wireless station at Woody Island was destroyed by fire, doubtless caused by lightning.

June 12 a message reached me from Lieutenant Thompson, in charge of the *Redondo* expedition, advising that he had been in the vicinity of the volcano, which was Mt. Katmai, on the mainland across the Shelikof Strait.

During the 9th, 10th, and 11th the appearance of the skies seemed to indicate that some substance was held in suspension, and at times most unpleasant and strangling gases filled the air, making it difficult to breathe.

The outlook for the future of this vicinity is at present a problem. While the fish are now very scarce, it is generally believed that they will return. Many gardens have been uncovered, but I doubt if they produce much this season, and their product will be greatly missed by the natives. Cattle are finding a little feed on the hillsides, where the deposits slid down, but all the feed is impregnated with sand and ashes.

The officers and crew of the *Manning* rendered gallant and unflinching service through an ordeal that was arduous and

Photo by Lieut. J. F. Hahn, U. S. R. S.

REFUGEES FROM KADIAK ON BOARD THE "MANNING"

terrorizing beyond description, and I cannot refrain from paying the highest compliment to many of the inhabitants of Kadiak, who by their courage and forgetfulness of self in this time of peril coöperated with us in every way in giving help to the weak and suffering.

Katmai Volcano is one of the long belt of active and extinct Alaskan volcanoes which extend for 1,600 miles from Kenai Peninsula, along the Alaskan Peninsula and Aleutian Islands. No less than 60 active or recently active volcanoes are already known, and this number will probably be increased when the territory has been more thoroughly examined. The belt includes Mt. Wrangell, whose huge dome reaches 14,000 feet elevation; Mt. Shishaldin, a most graceful peak, whose outlines rival Fujiyama, and Bogoslof, whose suddenly appearing and as suddenly disappearing islands have startled mariners for the past 100 years.

Immediately after the eruption the National Geographic Society, in coöperation with the U. S. Geological Survey, sent Mr. George C. Martin, a geologist of the Survey, to Alaska to make a reconnaissance of Mt. Katmai and neighboring volcanoes. Mr. Martin has been in the field of volcanic disturbance throughout the summer. His studies are preliminary to an extended investigation of the Alaskan volcanoes, which the National Geographic Society will inaugurate in 1913.

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THE NATIONAL GEOGRAPHIC MAGAZINE

HEAD-HUNTERS OF NORTHERN LUZON

By Dean C. Worcester

Secretary of the Interior of the Philippine Islands

Author of "Field Sports in the Philippines," "The Recent Eruption of Mt. Taal," etc., in the National Geographic Magazine

IN A recent article in the National Geographic Magazine I called attention to the fact that the number of non-Christian tribes in the northern part of the great island of Luzon had been grossly exaggerated, and that there were in reality but seven. The people of all but one of these tribes have, until recently, engaged in head-hunting.

It is my purpose to give, within the limits of this article, a brief account of each of the head-hunting tribes. The photographs reproduced in the accompanying illustrations were taken in part by me and in part under my direction by Mr. Charles Martin, the official photographer of the Philippine government. It should perhaps be said in passing that they are in every case strictly authentic and typical. I have visited the wild man's territory in northern Luzon annually for the past 11 years, and these photographs have been obtained on my yearly inspection trips.

THE NEGRITOS

Three years ago had any one stated in my presence that the Negritos, or any of them, were head-hunters, I should promptly have questioned the truth of the allegation; but I have since had reason to change my mind. In August, 1909, I was at last able to visit the hitherto practically unknown eastern coast of northern Luzon. The forest-clad slopes of the great mountain chain extending almost uninterruptedly from Baler to Cape Engaño, and the territory between these mountains and the Pacific, form the last important Negrito stronghold remaining in the Philippine Islands. In this region, and in this region alone, the Negrito is of practically unmixed blood, and has had little or no contact with white men or with Christian Filipinos.

My trip was made during the dry season. At this time, when the sea is as quiet as it ever gets on this forbidding coast, the Negritos come down to the shore in considerable numbers to fish, and it was an easy matter to observe through our field glasses their tiny shelters, which were usually close to, or actually on, the sea-beach.

DIFFICULTIES OF SOCIAL INTERCOURSE

Unfortunately it proved by no means easy to make calls upon the owners of these very primitive structures, owing to their more than retiring dispositions. A barrier reef, sloping abruptly from deep water to the very surface of the sea, borders this coast for scores of miles. Even in periods of apparent complete

NEGRITO PLAYING A NOSE FLUTE

Many of them know how to make and play upon these weird sounding flutes of bamboo (see page 847)

TYPE OF YOUNG NEGRITO

Profile view showing ornaments, including a bamboo ear plug

OUTLINE MAP OF NORTHERN LUZON

A NEGRITO SETTLEMENT ON THE NORTHEAST COAST OF LUZON
The inhabitants ran away on our approach (see page 837)

A NEGRITO "HOUSE" AND FAMILY

These shelters are inclined toward the sun or wind and vary in size from four feet by five to eight by six. This photograph was taken on the northeast coast of Luzon (see page 841).

calm the long Pacific swell breaks on the edge of this reef in such a manner as to make landing quite impossible.

Although it had been claimed that there were no ports for anything bigger than native dugouts, we found several fairly good small harbors, none of which were shown on the chart. Indeed, long stretches of the coast-line proved to be 10 to 15 miles out of place. We were able to land in these harbors, as well as at several other points where small fresh-water streams had prevented the growth of coral, so that there were passages through the reef to the sea. The approach of our steamer caused consternation among the Negritos, and we could plainly see them abandoning their "houses" in all haste and running for the jungle, where they remained in hiding in spite of all our efforts to get into communication with them (see page 836).

We did not attempt closely to approach their hiding places, as they are the bow-and-arrow men of the Philippines, and use their chosen weapons with extraordinary skill. They smear their arrows with an especially deadly poison, and the civilized Filipinos who inhabit the outskirts of their territory are agreed that a mere scratch from such an arrow is promptly fatal (see page 844).

Not until we reached the immediate vicinity of Palanan, the northernmost Filipino settlement on the east coast of Luzon, did we succeed in getting into actual touch with these interesting and very primitive people. I had previously been among Negritos in the islands of Mindanao, Negros, Panay, and Palawan, and in the provinces of Bataan, Zambales, Pampanga, Rizal, Bulacan, Pangasinan, Isabela, and Cagayn in Luzon. Indeed, I had visited every important region in the Philippine Islands inhabited by Negritos. None of the people of this race hitherto encountered by me were head-hunters; but there is no doubt that the representatives of this tribe which now inhabit northeastern Luzon engage

MAKING ORNAMENTAL SCAR PATTERNS

The man has just had numerous cuts made into the skin of his chest, into which dirt will be rubbed. The woman holds between the thumb and forefinger of her right hand the piece of bamboo with which she did the cutting.

in this custom. Indeed, they are more feared by their Christian neighbors than are the Ilongots.

HABITS OF THE NEGRITOS

The Negritos are generally considered to be the true aborigines of the Philippines, and are racially sharply distinct from the other numerous tribes of the Islands, except the Ilongots of Luzon, the Mangayans of Mindoro, and the Tagbanuas of Palawan, with whom they have intermarried to a considerable extent. They are of low, sometimes even dwarfish, stature, with very dark brown, or black, skins. Their heads are covered with closely curling hair and many of them have abundant woolly beards. They often have so-called "pepper-corn" hairs distributed very abundantly over their bodies. Their noses are broad and flat, their lips thick, their arms disproportionately long.

They do not tattoo their bodies, but ornament them with scar patterns, produced by cutting through the skin with sharp pieces of bamboo and rubbing dirt into the wounds thus formed in order to infect them and make good big scars! In this respect they differ from all other wild peoples in the Philippines and agree with the dwarfs of Africa, whose scar patterns, as shown by photographs which have been reproduced in the NATIONAL GEOGRAPHIC MAGAZINE, are, in some instances at least, practically identical with those in vogue among the Philippine Negritos (see pages 838, 839).

The men wear small clouts, and the women short skirts reaching from the waist to the knee. They are very fond of brightly colored cloth, scarlet being preferred, but individuals who cannot get cloth, and there are many such, use instead the so-called "bark cloth" so widely employed by inhabitants of the

A NEGRITO WOMAN

Note the ornamental scar patterns. In her left ear she has medicine for a headache, and around her neck hangs medicine for a sore throat.

TWO NEGRITOS WITH THEIR HOUSE AND BELONGINGS

This photograph was taken in Bataan Province, Luzon, where the Negritos have come much in contact with the Tagalogs, and as a rule build exceptionally good houses

A NEGRITO MAKING FIRE BY RUBBING PIECES OF BAMBOO TOGETHER

islands of the Pacific. Men frequently shave the crowns of their heads "in order to let the heat *out*"!

CONSTRUCTION AND CONTENTS OF HOUSES

The tiny settlements which we visited were abandoned very hastily, but it was easy to obtain complete inventories of the property of their owners, which, even to the bows and arrows, was often left behind. The "houses" were constructed by covering small rectangular frameworks of poles with a thin thatch of rattan leaves or grass. Each shelter thus made was inclined toward the sun, or wind or rain, and was held in a slanting position by a stick sharpened at one end and forked at the other, the sharpened end being pushed into the ground and the forked end placed against the shelter at or near its central point (see page 837).

The smallest of these structures measured about four feet by five, the largest some eight feet by six. Hanging from them, or placed under them, were a few cocoanut shells; an occasional earthen pot, usually broken; fish lines equipped with stone sinkers and with bone or steel hooks; an occasional small casting net; a few bits of bark cloth; bows of *Palma brava;* arrows with heads of *Palma brava,* bamboo, or, more rarely, of steel; a few rude *bolos;* scraps of cheap cotton cloth, and nothing more!

The domestic animals were dogs—which, strangely enough, neither objected to our approach nor got out of our way—and a few wild chickens, partially domesticated.

The Negritos told us that during the rainy season they went back into the mountains, where they sometimes planted yams, upland rice, or corn; but that evil spirits often obliged them to abandon their plantings before harvest time! Throughout the year they subsist chiefly on vegetable products, which they obtain from the virgin forest, and on fish and game. They are wonderful woodsmen and display great skill in taking fish and game and in still-hunting their enemies; but here their proficiency ends. They

A NEGRITO MOTHER AND CHILD IN THEIR NATIVE WILD

The boy was unafraid and evidently watching for the birdie to jump out of the camera

A NEGRITO WHO, LIKE MANY OF HIS TRIBE, HAS POINTED HIS FRONT TEETH

This is done by chipping off both corners with the aid of a small piece of wood and a bolo (see page 847)

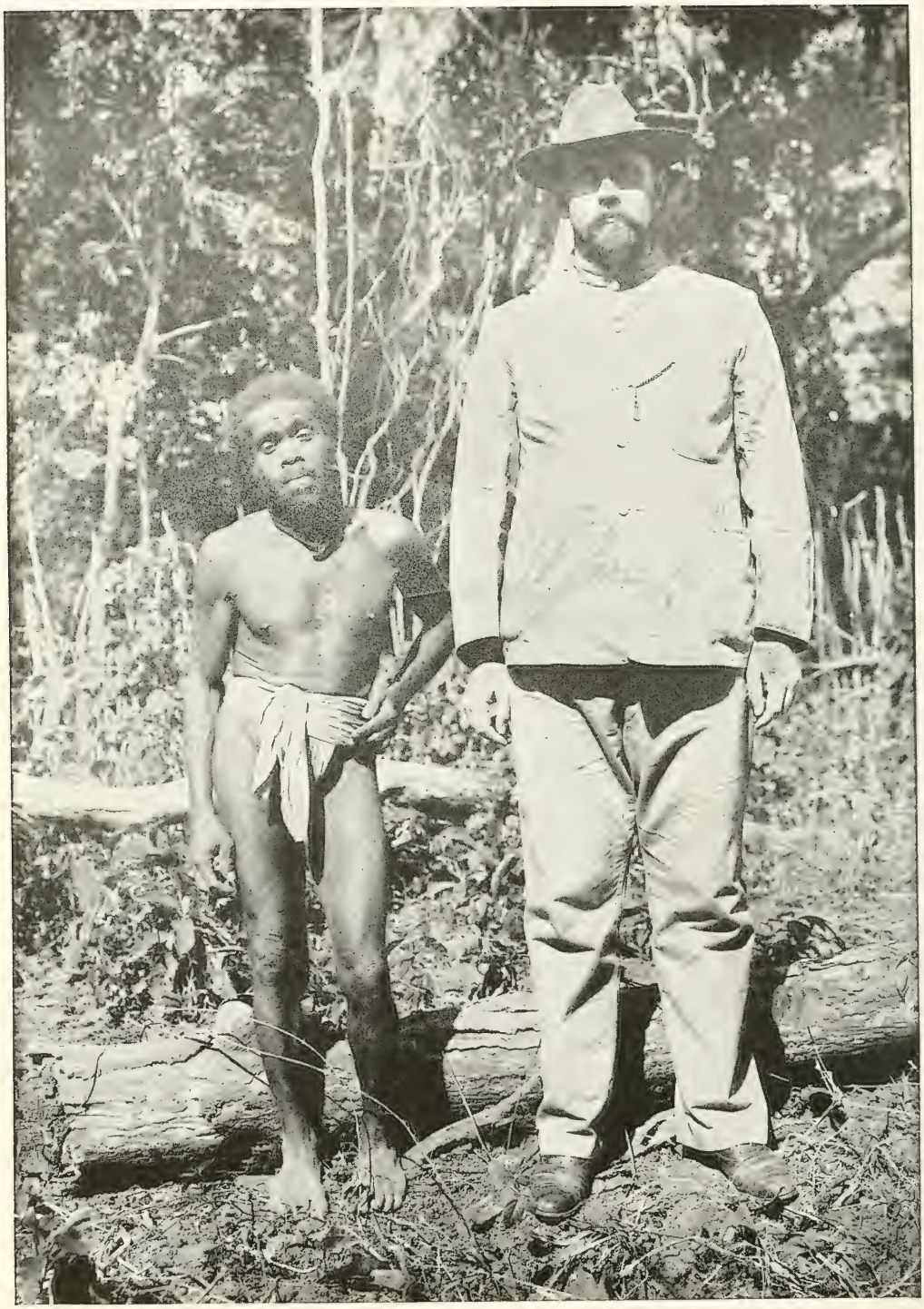
TWO NEGRITO MEN

With Governor William F. Pack of the Mountain Province. Photograph taken on the northeast coast of Luzon, near Palanan

NEGRITO BOWMAN

The Negritos are the bow and arrow men of the Philippines. Many of them shoot arrows with great accuracy, and some of them have even been known to bring down birds on the wing (see page 837).

NEGRITO MEN WITH BOWS, ARROWS, AND HEADAXES READY FOR THE TRAIL



A TYPICAL NEGRITO MAN WITH SECRETARY WORCESTER

This photograph shows the relative size of the Negritos compared with a 6-foot American

are good at nothing else, and their intelligence is of an exceptionally low order.

In other parts of the Philippines where Negritos have come more in contact with civilized natives, I have found them building larger huts, and, in rare instances, they even construct small houses, which approach more or less closely the poorer class dwellings of their Filipino neighbors. In the Cagayan Valley and in the province of Bataan, Negritos have been known to cultivate land in corn and rice for several successive years; but they are essentially a wild and nomadic people and every effort thus far put forth, by Spaniards or Americans, to educate them or materially to better their condition in any other way, save by protecting them from harsh treatment at the hands of their civilized neighbors, has resulted in complete failure.

AN ILONGOT BOY

The coming generation is more promising than the present one, but even the children carry weapons

TEETH CHIPPING

Many of the Negritos point their front teeth, but *not* by filing them, as is commonly supposed. A chip of wood is held behind the tooth to be operated upon; the point of a bolo is placed in such a position as to slant across the corner of tooth to be removed, and a sharp blow on the bolo chips a piece from the tooth. The opposite corner is similarly operated upon, and an artistic point is thus produced (p. 842)!

The music and dancing of the Negritos are especially interesting. Many of them know how to make and to play both the bamboo nose-flute and a kind of jews'-harp made from bamboo. Some of them use crude stringed instruments fashioned from single joints of bamboo, the strings being cut from the outer layer of wood, to which their ends remain attached, and being raised up by means of "bridges." The distribution of the several kinds of musical instruments above mentioned is more or less local, but the bronze tom-tom, or "gansa," is in universal use, although some Negritos play it with a drumstick, while others beat it with their hands. Many of their dances are pantomimic. Their singing is often weird in the extreme. It would be idle to attempt to describe it; only phonographic records could do it partial justice (see page 834).

DANCES

There are many stories current to the effect that Negritos are often to be met

AN ILONGOT HOUSE (SEE TEXT, PAGE 862)

They occasionally build quite large and well-constructed houses, to which access is had by means of notched tree trunks

with wandering through the forest in a state of absolute nudity, and that they indulge in various obscene dances. I am satisfied that the former series of tales are without foundation in fact. Objectionable dances are very rare among the wild peoples of the Philippines, although they are sometimes indulged in by the Moros, and are common among the Manobos of Mindanao. One apparently credible witness, who was a surgeon in the United States Army, informed me that he had once witnessed such a dance among Negritos in the wildest part of the Zambales Mountains. I have never observed anything of the sort, nor do I believe that such dances occur with any degree of frequency among these peoples.

The number of Negritos in the Philippines can hardly exceed 25,000, and it is constantly diminishing from purely natural causes. In many regions their birth rate is known to be materially below their death rate, and in my opinion they must be regarded as a "link" which is not now missing, but soon will be. Within my own recollection they have disappeared from Cebu, Masbate, and Sibuyan. At last accounts but 14 individuals remained in Tablas, where they were formerly numerous.

NOT TREE-DWELLERS

Statements to the effect that Negritos build houses in trees are, so far as my personal observation and information go, without foundation in fact.

Curiously enough, the head-hunting peoples of the Philippines are apparently limited to northern Luzon. None of the warlike hill tribes inhabiting other parts of the archipelago are known to take the heads of their victims.

The explanation of their head-hunting customs which is given by the Negritos of northeastern Luzon is very simple. They believe that each family must take at least one head per year or suffer misfortune in the form of sickness, wounds, starvation, or death. Their victims are always beheaded with bolos. Heads are buried in the ground under the "houses" of the men who take them. Plates, or ollas, are placed over the spots where the heads are buried, and possibly contain offerings to evil spirits. The "houses" under which heads are buried are then

AN ILONGOT WOMAN

The typical dress is a short skirt, often of bark cloth, but they are very anxious to get real cloth whenever it is possible (see p. 857).

ILONGOT WOMAN AND GIRLS

The women embroider remarkably well, considering the low state of civilization, and display great ingenuity in fashioning elaborately constructed ornamental work (see page 857)

abandoned and their supposedly fortunate owners look forward to a period free from death, sickness, or injury, and to success in their hunting and fishing.

THE ILONGOTS

The Ilongots, sometimes called the Ilongotes, or Ibilaos, are numerically even less important than are the Negritos. Their number is not exactly known, but probably does not exceed 6,000.

They are forest dwellers in the strictest sense, living in small groups scattered through an enormous, heavily wooded area, which was originally divided between the provinces of Isabela, Nueva Vizcaya, Tayabas, and Pangasinan, but has lately been all incorporated with the province of Nueva Vizcaya, in order to bring the people of this troublesome tribe under one provincial administration.

While the Negritos are usually content to fight with each other and seldom molest outsiders, the Ilongots have waged war on their more civilized neighbors from the beginning of historic times. The latter have naturally reciprocated, with results disastrous to the Ilongots, whose territory formerly extended as far south as the Laguna de Bay, in immediate proximity to Manila.

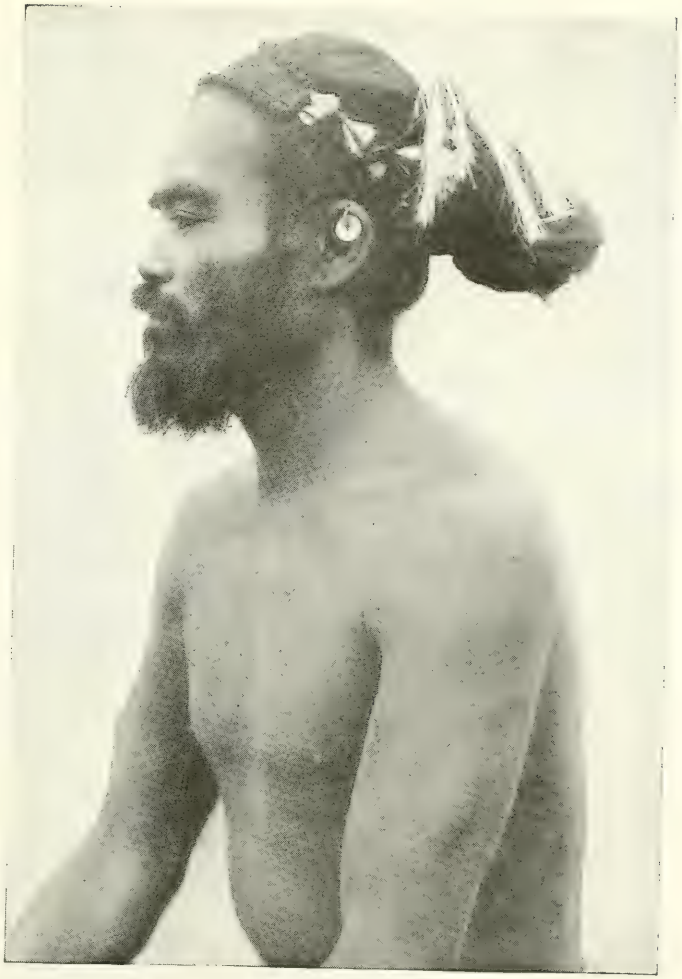
In the northern part of their range the Ilongots come in close touch with the Negritos and freely intermarry with them. Among the people of this section of the tribe Negrito blood is naturally

AN ILONGOT FAMILY

Note the peculiarly shaped shield and the lance with spiral wrappings. In the use of the shield they differ from the Negrito, who have none, but like them are nomadic in disposition (see page 863).

AN ILONGOT HEADHUNTER

Curly hair and heavy beards are frequently met with among the Ilongots, and it is commonly explained as being due to the presence of Negrito blood; however, not a few of this tribe seem to be typical Malays (see page 857).



AN ILONGOT MAN

Showing typical head dress and ear ornament. The men tie up their hair in a sort of chignon, extending horizontally from the back of the head (see page 860).

AN OLD ILONGOT MAN

Some of the old men of this tribe are very hairy, and at once call up in the mind the Ainus of Japan.

AN ILONGOT MAN

Wearing ear ornaments made from a bird's beak. They frequently shave their heads to "let the heat out" (see page 841).

AN ILONGOT MAN SHOWING TYPICAL DRESS AND ORNAMENTS

Note the extraordinary ornament, fashioned from the beak of a hornbill, which he wears on his forehead (see page 858)

AN ILONGOT DANCING TO MUSIC

He is showing how he crept up on and killed his enemy. Note the broad knife which he brandishes

AN ILONGOT DANCING AND SHOWING TO AN ADMIRING THRONG HIS METHOD OF ATTACK

TWO ILONGOTS DANCING

The musicians at the left are playing on a stringed instrument fashioned from bamboo

MANY ILONGOTS ARE FOND OF MUSIC AND DEVELOP STRANGE AND WONDROUS SOUNDS FROM THEIR INSTRUMENTS

strongly in evidence. In fact, curly hair and heavy beards are frequently met with among the Ilongots wherever found, and these physical peculiarities are commonly explained as being due to the presence of Negrito blood. However, not a few of the members of this tribe seem to be typical Malays (see page 852).

Like the Negritos, the Ilongots use bows and arrows with great skill, but they also use light wooden shields of peculiar form, while the Negritos have none.

The typical dress of the men is a small clout, and that of the women is a short skirt, often of bark cloth. However, both men and women are anxious to get hold of the real article and lose no opportunity to do so (see page 849).

ARTISTIC WORK BY THEIR WOMEN

The women embroider remarkably well, considering the low stage of civilization to which they have attained, and both men and women display great ingenuity and skill in the fashioning of

A YOUNG KALINGA

He has the peculiar eyes which are typical for the people of this tribe. The Kalinga are not forest-dwellers, but live on the open hillside and bare plain (see page 863)

elaborately constructed ornamental work, using small beads of various colors, hair from the manes and tails of white horses, bits of bright metal, pieces of mother-of-pearl, copper or brass wire, and the beaks of hornbills. From wire they make elaborate and beautifully constructed chains, which they wear about their necks (see pages 850, 854).

Girdles of cowries strung on colored cloth are considered especially valuable, as are long ear pendants made from the scarlet beaks of hornbills and mounted with brass. The latter ornaments are worn by men only. Both men and women wear large mother-of-pearl ear ornaments decorated with conventional scratch-work patterns.

Not only do the women embroider with surprising skill, but they make tassels of

A KALINGA CHIEF

Note his high cheek-bones and wealth of tattooing. This man has taken many a head

worsted or colored cotton thread, which they tie in tiny tufts on the separate hairs of their horsehair ornaments. Small bells are especially prized, both by men and by women, and are worn on their necklaces or girdles, or about the calves of their legs. Fine copper wire is hung in coils about the neck, and a narrow cord, beautifully woven from vegetable substances, is worn in similar fashion.

MUCH ATTENTION TO HAIR DRESSING

Neither men nor women cut the hair, which, in the case of the men, is tied up

A KALINGA MAN WEARING TYPICAL DRESS AND ORNAMENTS

They "bang" their hair over the forehead, and the back hair is allowed to grow long and fall down over their shoulders.

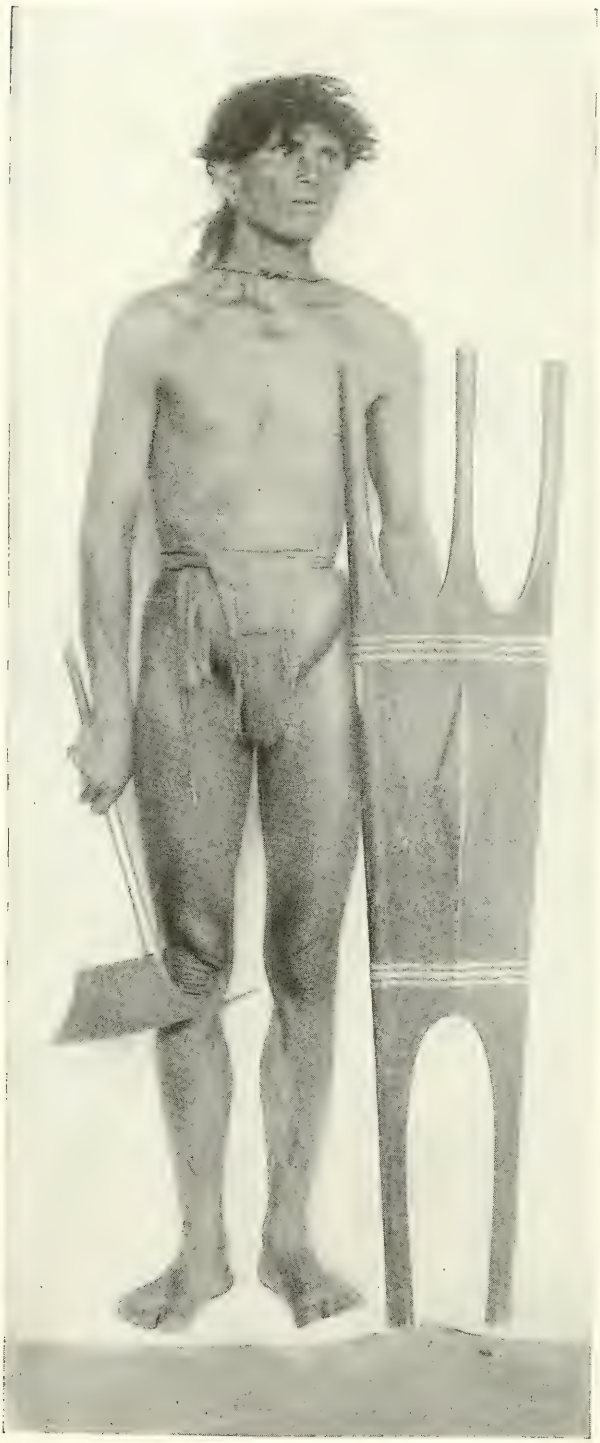
with rags to form a sort of chignon extending horizontally from the back of the head. Many of the men wear peculiar nets above their foreheads for the apparent purpose of keeping their hair out of their eyes. Clouts are often elaborately ornamented with beadwork, and the sheaths of arrows are adorned with beads and tassels. Infinite patience and pains are required to fashion these elaborately constructed ornaments from the few and simple materials at hand. Woe betide the man who rides a white horse into the Ilongot country, for, unless he keeps a guard over it, he will find its mane missing and its tail cropped to the skin!

Ilongot men set special store by steel armlets with inlaid brass band. It is difficult to obtain these armlets, as their owners are usually unwilling to part with them on any reasonable terms.

Ilongots use bows and arrows, both in warfare and in hunting deer and wild hogs. Most of their arrows have quite skillfully shaped steel or iron heads. Their other weapons of offense are war knives, carried in curved wooden sheaths decorated with metal bands, and poorly made lances of small size, the heads being hardly larger than good-sized arrow heads. The shafts of their lances are frequently ornamented with spiral bands of metal or of vegetable substances. For protection against arrows the Ilongots use long, narrow, and very light wooden shields of a peculiar and highly characteristic form. These shields are almost invariably painted a dull brick red. Ornaments fashioned from beads, hog bristles, white horse-hair, and threads of brightly colored cotton or worsted are often worn by the men about their necks, their waists, and the calves of their legs.

ANOTHER VIEW OF THE KALINGA DANDY

Note the scarlet feather ornaments in his hair; also his ear plugs. They frequently wear jaunty little rattan caps like the Bantoc Igorots (see page 863)



BAKIDAN

A famous Kalinga chief, in fighting trim, noted for his bravery in the face of the enemy

THE ROOF-TREE

The Ilongots occasionally build quite large and fairly well constructed houses, to which access is had by means of knotched tree trunks used in lieu of ladders or stairs. From each end of the ridge-pole of such a house extends a hornlike piece of wood, which curves gently upward (p. 848).

Their houses are usually very filthy, and are scantily furnished with only the articles strictly necessary to make it possible for a rather primitive people to grow rice, yams, and corn, take fish and game, attack their enemies, and defend themselves.

Ilongots are especially skillful in hunting deer, which they drive into nets and then dispatch with arrows or lances.

Some of the members of this tribe are almost as nomadic as are the neighboring Negritos, while others have fairly permanent places of residence. They plant rice and sweet potatoes in considerable quantity, and also grow some sugar-cane, which they use to make a sour fermented alcoholic drink. Ground is usually prepared for planting by girdling and killing forest trees, which stand so closely together that the earth between them is free from grass or underbrush.

TREACHEROUS CHARACTERISTICS

Until very recently the several Ilongot settlements have been quite constantly at war with each other, and the people of this tribe have annually murdered considerable numbers of Christian natives.

The Ilongots almost invariably attack from ambush, lying concealed near trails and rushing upon their enemies from behind after the latter have passed.

They usually cut off the

heads of their victims, sometimes tossing them about and playing with them, and again carrying them for some little distance only to throw them away. It does not appear that they ordinarily take the gory trophies home, as do the representatives of all the other head-hunting tribes, although the hands or hearts of their victims are apt to be carried away by them as trophies.

Men of this tribe murdered Dr. William Jones, an ethnologist of the Field Natural History Museum, after he had worked among them for more than a year. Fortunately his notes were saved, and, when published, they ought to give the first fairly comprehensive account of this little-known tribe.

THE KALINGAS

The name Kalinga, which means "enemy," is applied to the people of a sharply marked warlike tribe numbering some 66,000 souls. They inhabit the region bounded by the subprovinces of Ifugao and Bontoc on the south, Abra and Ilocos Sur on the west, Apayao on the north, and Cagayan and Isabela on the east. They are not forest dwellers, but live on the open plains and bare hillsides, or in large clearings along mountain streams. They are apparently of Malayan origin, and only in very exceptional cases do they show evidence of the admixture of Negrito blood. Their dark-brown bodies are, as a rule, kept quite clean, and are often beautifully developed. They have high cheek-bones and eyes shaped like those of the Chinese, but usually set level and very far apart (see page 858).

FOND OF GAY COLORS

The men "bang" their hair over the forehead and make straight cuts extending back above the ears through that hair on the sides of their heads. Their back hair, which is allowed to grow long, sometimes hangs down over their shoulders. They wear clouts,

A KALINGA GIRL

Wearing the typical dress of well-to-do women. Unlike the women of neighboring tribes, they generally wear a short upper garment. Note the heavy ear ornaments of mother-of-pearl.

A TYPICAL KALINGA

Showing the method of cutting the hair. All Kalinga men who can afford it purchase and wear gayly colored blankets

SAKING, A FAMOUS KALINGA FIGHTING CHIEF

They are of Malayan blood and only in exceptional cases do they show evidence of the admixture of Negrito blood

IN FULL REGALIA

The Kalingas of both sexes bedeck themselves for all occasions, their garments being fashioned from either handsomely embroidered fabrics woven by their women or gaudily colored and large-figured imported cotton goods (see page 873).

WIFE OF A KALINGA CHIEF

Note the false hair with feather plumes thrust into it; her heavy brass earrings, and the load of agate beads about the neck. Agate beads are their most highly prized possessions, and the older and rougher the beads the greater their value. The larger beads are worth a carabao each (see pages 873, 875).

A KALINGA WOMAN

This photograph shows tattooing which, in many cases, takes the place of an upper garment. The ornaments are typical

A KALINGA HOUSE

The houses are constructed with hardwood frames, removable rattan or runo grass floors, and thoroughly water-tight roof (see text, page 875)

A KALINGA FAMILY

Note the ear pendants of mother-of-pearl worn by the women. Most Kalinga women have skirts reaching well below the knees and, in some instances, reach the ground (see text, page 873).

A KALINGA WARRIOR

The name Kalinga means "Enemy," and this warlike tribe number some 66,000 (see text, page 876)

A KALINGA TREE-HOUSE

In regions where life and property are especially insecure they often build their houses in trees. Note the people in the doorway (see page 875)

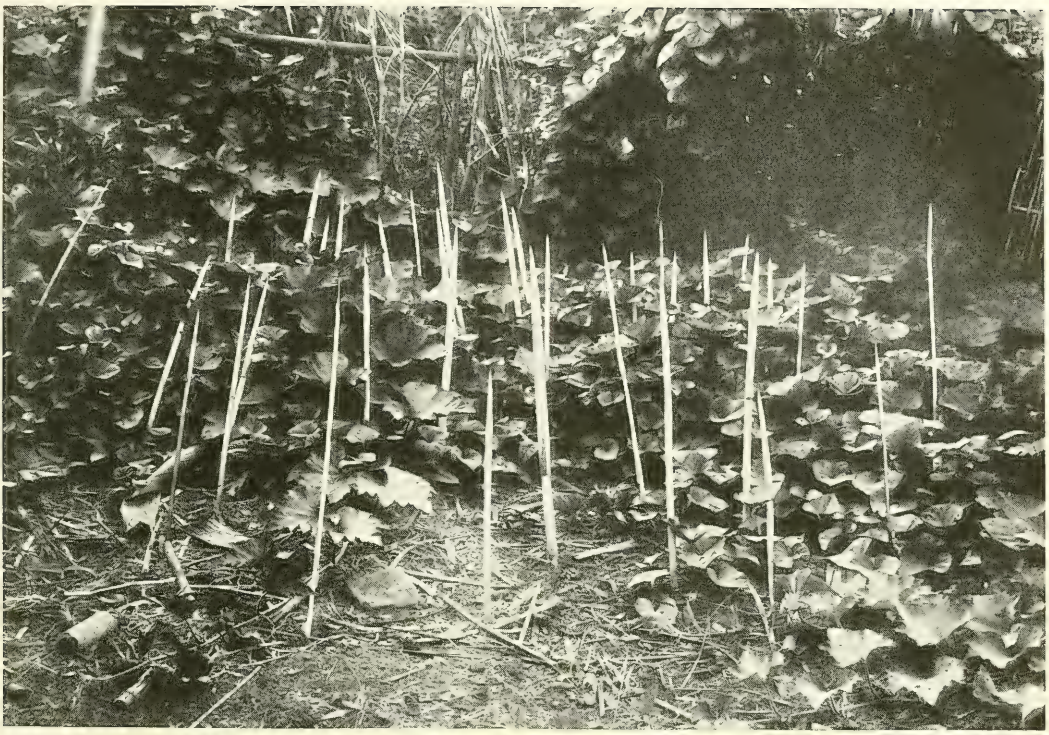
A KALINGA HEAD-HUNTER

Over the door of the house are hung three strips of bark cloth, each spotted with human blood, showing that this man had recently participated in three successful head-hunting raids (see text, page 877).

which are often covered with beads or with small white buttons. Many of them also wear short, tight-fitting jackets made from cloth woven by their women, or from gaily colored calico. Nearly all of them have peculiar shaped carrying-bags with two large ends and a narrow connecting portion in which is an opening, which is closed by means of sliding metal rings. These bags are usually hung about their necks.

All Kalinga men who can afford to do so purchase gaily colored blankets. They fold them diagonally, knot the ends together, and wear them with the knotted ends over one shoulder and the wide part of the folded blanket under the opposite arm.

Many of the men wear huge ear plugs inserted in such a way as to turn the perforated lobes of the ears directly forward. These plugs are usually made of wood, and their anterior faces are ornamented with coins, bits of bright metal, or gaily embroidered cloth. Great cylindrical rolls of bright-colored worsted



A NEST OF PUAS THAT WERE CONCEALED BY THE UNDERGROWTH

Puas are sharpened strips of bamboo which are set for the feet of the unwary by Kalingas, Bontoc Igorots, and Ifugaos alike

sometimes take the place of wooden ear plugs. The tattoo patterns are elaborate and often cover arms, chest, and back very completely.

ORNAMENTS

On state occasions well-to-do Kalinga men ornament their hair with tufts of scarlet feathers, to the tips of which bright yellow feathers have been attached by means of bits of beeswax. Hibiscus flowers and marigolds are also often used as hair ornaments, and in the vicinity of Lubuagan, where the territory of the Kalingas joins that of the Bontoc Igorots, it is not unusual to see men wearing on the backs of their heads the jaunty little rattan caps characteristic of the latter tribe. However, the Kalingas are not content to take these caps as they find them, but cover them with carefully matched beads of agate or imitation agate. Agate beads, by the way, are their most highly prized possession, and the older and rougher the beads the greater their value.

Armlets or necklaces are the only other ornaments of the men, but the skin of their chests and backs, and often that of their faces and arms as well, is in many cases covered with elaborate and beautiful tattooing.

Most of the Kalinga women have skirts reaching well below their knees, and in some instances clear to the ground. These skirts may be made of handsomely embroidered fabrics woven by the women themselves, but more commonly are fashioned from gaudily colored and large-figured imported cotton goods. Unlike the women of neighboring tribes, they usually wear a short *camisa*, or upper garment. It fits the body tightly and has sleeves. The wives of rich men are fairly loaded down with necklaces of agate or imitation agate beads.

"Switches" are added to the abundant hair with which nature has favored them, and their heads are often piled high with raven tresses into which are stuck beau-

A KALINGA WAR DANCE

Note the peculiarly shaped shields which are always in evidence and the tom-tom players who are furnishing the music. The handles of the tom-toms are fashioned from the lower jaws of human skulls (see page 877)

A KALINGA WAR DANCE

The beating of the tom-toms becomes faster and faster as the warriors warm up to their work (see text, page 877)

tiful feather plumes similar to those worn by the men. Almost every Kalinga woman also wears a pair of heavy brass ear ornaments of a conventional pattern, and all who can afford it have in addition great mother-of-pearl ear ornaments shaped like a solid figure 8.

Many of the Kalingas construct large and well-built houses, with hardwood frames, removable rattan or runo grass floors, and thick, convex, thoroughly water-tight roofs. The floors of these houses are taken up daily and washed in the neighboring streams. On a raised ledge at one end of the single room sit ancient and highly prized jars of *basi*, an alcoholic drink made from boiled and fermented sugar-cane juice. There is usually a shelf for plates and other household utensils, which extends the whole length of one side of the house. China plates and glazed earthenware jars are highly prized by these people, and many of those which they have are doubtless very old.

TREE DWELLINGS

In regions where life and property are especially insecure they often build their houses in trees, pulling up their entrance ladders in case of danger.

The houses are ordinarily grouped in small villages, which are quite permanent in character, although a village is sometimes abandoned upon the advent of smallpox or other dangerous communicable disease, or after being successfully raided by a hostile war party.

Until within a short time the Kalingas have been fierce and inveterate head-hunters, constantly at war among themselves and with their non-Christian neighbors of other tribes. Furthermore, they frequently wiped out Filipino hunting parties and even attacked small Filipino settlements. Their weapons of offense are strong, skillfully fashioned lances and gracefully shaped but deadly head-axes. Their defensive weapons are beautiful black shields ornamented with scarlet and yellow or black and white

A DEAD KALINGA GIRL

The dead of several of the northern tribes are kept seated in chairs like the one shown in this picture until their funeral feasts, which often last many days, are over

rattan lashings. These shields are invariably of the peculiarly graceful pattern shown in the accompanying illustrations and differ completely in form from the shields of all other Philippine wild tribes.

War parties often number 50 or more individuals. The Kalinga is by no means above lying in ambush, but he not infrequently attacks in the open. When two or three men are down, the scrimmage resolves itself, on the part of their enemies, into an effort to take and get away with their heads, while their friends endeavor to save their bodies intact. When a war party has taken one or more heads it returns to the village whence it came.

HEAD-TAKING CELEBRATION

The customs connected with head-taking which prevail in the northern part of the Kalinga country are peculiar and interesting. We will suppose for simplicity's sake that a war party has taken a single head. Upon its return it is received with war cries and shouts of joy, and amidst uproar and confusion each warrior runs home and brings back a piece of clean white bark cloth. He dips this in the blood oozing from the severed neck, again hastens home, and hangs it over the door of his house. The bloody emblem constitutes a sort of "sign of the passover," since it is believed to avert sickness and to protect the occupants of the house from the vengeance of the friends of the decapitated enemy.

Meanwhile the fortunate individual who took the head carefully cuts through the cap of the skull with his head-axe and removes it, scalp and all. He chops it into as many pieces as there are members of the party, and each warrior on returning from his home is presented with a bit as a keepsake.

It is asserted that it is a common practice to pour *basi* over the brain, which has been exposed by the removal of the top of the skull, and to mix brain-matter and *basi* by vigorous stirring. This horrible concoction is then passed around, the head serving as a drinking cup, and those who will may partake. It is said that only the very brave do so, and this can readily be believed! The skull is then cleaned by boiling, and the lower jaw is used for the handle of a tom-tom, or *gansa*.

The old women take charge of the remainder of the skull and place it, with similar relics, in some safe hiding-place. Once a year these old hags bring forth all the mutilated skulls and use them in connection with a secret ceremony from which men are strictly excluded. One of the objects of this ceremony is to insure good crops.

PREPARING THE HEAD

Prior to boiling and cleaning, the head is placed on a heap of flowers in a basket of peculiar and characteristic form, woven at one end of a piece of bamboo. The other end of the bamboo is sharpened and driven into the ground.

A *cañao* is then held. The men squat in a great circle, around which the women walk or stand. *Basi* circulates freely and the excitement of intoxication is soon added to that caused by the return of the victorious war party. Three or four men beat with their hands upon *gansas*, the handles of which are hooked into the waistbands of their clouts, the *gansas* themselves resting upon their thighs as they kneel. The deafening clash of the *gansas*, in the old familiar cadence which for uncounted centuries has celebrated success in war, adds to the general excitement, which finds vent in the monotonous, high-pitched, ululating war cries characteristic of the people of this tribe.

REACTING THE ACHIEVEMENT

Into the ring steps the hero of the occasion, dressed in his best clothes, decked with his gaudiest ornaments, and bearing the shield, lance, and head-axe used in the recent fight. Behind him there creeps along the ground a strange shrinking figure clad in soiled garments, with a dirty cotton blanket pulled over its head. The hero attracts attention to himself by emitting a squall which resembles nothing so much as the yell of a puppy when its tail is heavily trodden upon.

He then begins to speak in a monotonous and highly artificial falsetto voice, the tones and cadences of which are strongly suggestive of those of a Japanese actor. With word and gesture he describes his recent exploit, using the shrinking figure beside him as a dummy to represent his fallen foe. When he stops for breath the *gansas* strike up again, and when their clangor ceases he resumes his narrative. After concluding his pantomimic discussion of his latest exploit, he describes and boasts of previous achievements.

Incidentally he indulges in high stepping and high *jumping*, and displays deadly skill in the manipulation of his weapons. The crowd grows ever more excited and, during the intervals while the *gansas* are playing, shrieks its ap-

GUINED, A CELEBRATED IFUGAO CHIEF

Note the peculiar head dress and curious ornaments. They seldom go about without weapons; the handle of his knife can be seen on the left side

proval and shrills its monotonous war cry. Finally, when his voice has grown hoarse and his muscles are tired, the principal actor retires and another takes his place. As darkness comes on a blazing fire is lighted within the *cañao* circle.

Ultimately the young and vigorous warriors who participated in the recent fight are succeeded by the old men, who have been kept at home by the burden of years and infirmities. Strong drink has caused the dying fire in their veins to flare up for the moment. Each of them has a history of warlike deeds, which he proceeds to recount. The crowd already knows his story by heart, and, when the forgetfulness of age or that of intoxication causes him to falter, prompts him and shouts with laughter at the joke.

Gradually the *basi* begins to exert its stupefying effect; but so long as the music, the dancing, and the shouting continue every one manages to keep awake. At last food is passed, and in the interval during which it is being consumed the liquor gets a fair chance to work. As the east begins to glow with the coming dawn, men and women fall asleep in their places, or hasten to their homes, and the *cañao* ends, for the time being at least.

I note that the editor of one of the great American journals has stated that I exaggerate the wildness of the "Igorotes," by which tribal designation he apparently means the wild hill men of northern Luzon taken collectively.

I wish that he might have sat by my side at a Kalinga head *cañao* which I was forced to witness at Boia when I visited that place with one American and one Filipino companion on a trip which took me for days through territory where neither a white man nor a Filipino had ever been seen before. Would that I had the words of a Kipling to describe what I then saw; but if there is anything wilder to *be* seen, may I be spared from seeing it!

AGRICULTURAL ADVANCE

The Kalingas have made considerable advances in agriculture. They build terraces on the mountain sides and grow rice, which they cultivate with great care. Yams are raised in considerable quantity, and especial pains are taken in the cultivation of sugar-cane, from which is obtained the *basi,* so dear to the heart of the wild men of northern Luzon.

THE IFUGAOS

The Ifugaos, of whom there are approximately 123,000, inhabit a relatively small and excessively mountainous region, which formerly constituted the northwestern portion of the province of Nueva Vizcaya, but has now been made a subdivision of the Mountain Province. They are of rather small size and are wiry rather than heavily muscled. The men cut the hair in a manner peculiar to the tribe, the result obtained being that which would be had if a good sized bowl were pressed well down over the crown of the head and the hair were shingled closely up to the edge of the bowl. They tattoo their chests and necks and sometimes their thighs. Their tattoo patterns are entirely different from those of the Kalingas or the Bontoc Igorots, and cover the skin much less thickly. Women tattoo only the arms.

SOMBER IN DRESS

The dress of both men and women is as somber as that of the Kalingas is gaudy. The men wear unornamented clouts, but often carry small cotton blankets, which they wrap about their shoulders upon occasion. Clouts are usually of a dark blue color with or without a white or small scarlet figure. Blankets are black, dark blue, or blue and white. Headmen wear belts fashioned from the opercula of sea-shells. In bad weather they also wear raincoats of split rattan.

The women wear excessively short skirts wrapped about the body far below the waist and often not extending more than half way to the knee. A fold in the upper part of

A YOUNG IFUGAO WARRIOR READY FOR THE TRAIL

Note his peculiar belt and his split rattan rain-coat, his pipe, and earrings (see page 883)

AN IFUGAO

Showing typical tattoo pattern extending high on the neck. He was not altogether sure that he desired to be photographed

AN IFUGAO

Note the conventional dancing men tattooed on his chest. These patterns are entirely different from those of the Kalingas or Bontoc Igorots (see page 870).

the skirt serves in lieu of a pocket. Upper garments of any sort are the very rare exception. The women allow their hair to grow long, and do not cut it in any way. Sometimes it hangs down their backs; sometimes it is coiled about their heads in simple fashion. It may be fastened up with strings of beads; but the women, like the men, usually have few if any ornaments. Both are inordinately fond of great spiral coils of thick brass wire, the men wearing them on their legs, the women on their arms.

The Ifugao house is small but well constructed. It stands upon four or more posts firmly imbedded in the ground. The posts are sometimes carved, and are almost invariably provided with projecting shoulders, which prevent rats from climbing into the houses. The floor is usually of boards, and the sides are of boards or of bamboo basketwork. The roof is well and thickly thatched. The average house has but one small door and no windows. Its interior is, of course, necessarily dark, and is made more so by the soot from the pitch-pine fire, which is usually kept burning on a rudely constructed hearth. Door-posts and even the under surfaces of floor-boards are sometimes ornamented with rude wood carvings (see pages 884, 885).

Each house has a storeroom and a living-room, the former in the peak of the roof above the latter. The storeroom is reached by means of a short ladder. It serves as a depository for rice, other foodstuffs,

AN IFUGAO WARRIOR

These fighters carry beautifully fashioned and deadly steel-headed lances. Note the battered but serviceable shield

AN IFUGAO WOMAN

The women wear excessively short skirts wrapped about the body below the waist. A fold in the upper part of the skirt serves as a pocket (see page 879).

and a miscellaneous assortment of household goods. Under the houses of wealthy Ifugaos huge carved wooden resting-benches, called "tagabi," are usually to be seen (see picture, page 885).

Although many portions of the Ifugao territory are very thickly inhabited, there is not a single large town. The houses are grouped in tiny villages, which usually occupy strategic positions among the wonderful rice terraces on the steep mountain sides, so that access to them in the face of opposition is well nigh impossible unless the would-be callers are well provided with firearms and ammunition.

HYDRAULIC ENGINEERING AMONG SAVAGES

The Ifugao may be a barbarian, but he is an excellent hydraulic engineer. His irrigation ditches, running for miles along almost perpendicular mountain sides, and his marvelous rice terraces, which sometimes extend upward on the steep slopes for thousands of feet and have dry stone retaining walls 10 to 40 feet in height, are the wonder of all who have seen them. Furthermore, the earth of those terraces is fertilized, and the growing rice is thoroughly weeded and well cultivated. The crop, which is harvested by cutting the heads one at a time, is often tremendous.

Yams are also grown on the steep mountain sides, but the Ifugaos care little for sugar-cane and seldom trouble to raise it. They utilize rice in making an excellent fermented drink known as *bubud*. They keep chickens, dogs, and pigs, but no cattle.

The Ifugaos make good lance-heads and war-knives. They also carve wood with some skill and weave very serviceable wicker baskets. The women make cloth.

The Ifugaos, like the Kalingas, have until very recently been inveterate head-hunters. When I first entered their territory, in 1903, many of their houses were ornamented with fresh human skulls,

IFUGAO GIRL

Her ear ornaments and the pieces composing the shorter of the necklaces about her neck are made of copper. Tattooing is common among both sexes, the women decorating only the arms (see page 879).

and I saw various unfortunate victims of head-hunting raids.

EXHIBITING GORY TROPHIES

When an Ifugao war party returns with a head, it executes a ceremonial march, or dance—one hardly knows which to call it—which defies successful description. The men have their split-rattan raincoats on their backs. On the insides of these raincoats are pockets, which form convenient receptacles for gory trophies. The warriors carry beautifully fashioned and deadly steel-headed lances and serviceable, plain board shields, strengthened by rattan lashings to prevent splitting. Zigzag white marks are painted on the shields, indicating a ceremonial occasion.

The warriors do not approach stand-

AN IFUGAO HOUSE

The Ifugao houses are small but well constructed, standing upon four or more posts, which are sometimes quaintly carved, and are invariably provided with projecting shoulders to prevent rats and other small animals from gaining entrance into the house (see pages 881, 885)

AN IFUGAO RESTING BENCH

Note also two carved supporting posts of a house. Shoulders have been left on them to keep out animal intruders
(see illustration on page 884, and text, page 881)

IFUGAO GIRLS ASSISTING EACH OTHER IN TOILET

The women allow their hair to grow long, generally wearing it hanging down their backs
(see page 881)

ing, but creep along the ground, and in this position execute a sort of lockstep, beating upon their shields with billets of wood and bending in perfect unison far to the right and then far to the left. Some of the men make threatening motions with their lances. It is impossible for me to describe the weird effect produced, but I hope yet to be able to use a moving-picture camera on a file of men engaging in this strange ceremonial, which they will doubtless soon forget, as head-hunting has now practically ceased among them.

When the dancing ground is reached the head is impaled upon a short stake and the warriors circle around it in the characteristic war dance of this tribe. Some of them take off their ornaments and hang them on the head, at the same

AN IFUGAO FAMILY ON THE MARCH

Their field equipment is very light and they cover distances very quickly. Even the baby is interested in what is going on

AN IFUGAO VILLAGE

Note rice terraces surrounding the village. Although many portions of the Ifugao territory are thickly inhabited, there is not a single large town, the houses being usually grouped in small villages (see page 882)

AN IFUGAO WOMAN MAKING CLOTH

The Ifugao men carve wood with some skill and weave serviceable wicker baskets. The women make cloth as shown above

time jeering at it as if it were capable of hearing and understanding them. Dancing and feasting may last for days.

Ultimately the skull, which has not been mutilated in any way, is boiled and thoroughly cleaned. The lower jaw is fastened in place with rattan and the trophy is taken home by the man who won it. It serves him as a household ornament. It may be placed with other skulls on a board shelf beside the door of his house; it may find a resting place within, over the fireplace; it may be placed outside at one corner with the skulls of carabaos and pigs which have been eaten at feasts.

I have seen a house with a tasteful ornamental frieze of alternating carabao skulls and human skulls extending around it at the height of the floor! I have seen others with great open-work baskets of skulls hanging under the eaves.

THE ONE FAMILY DISGRACE

A man who loses his head is considered to have treated his family and friends somewhat shabbily. He is not buried as an ordinary person would be, but is carried to a resting place on some hillside far from his native village. A tunnel is excavated in the earth, his body is carried into it and placed in a sitting position, and the tunnel is then filled. A lance is thrust into the ground over the grave to show that he was killed in war, and an *anito* image, rudely fashioned out of grass, may be left to watch over his last resting place.

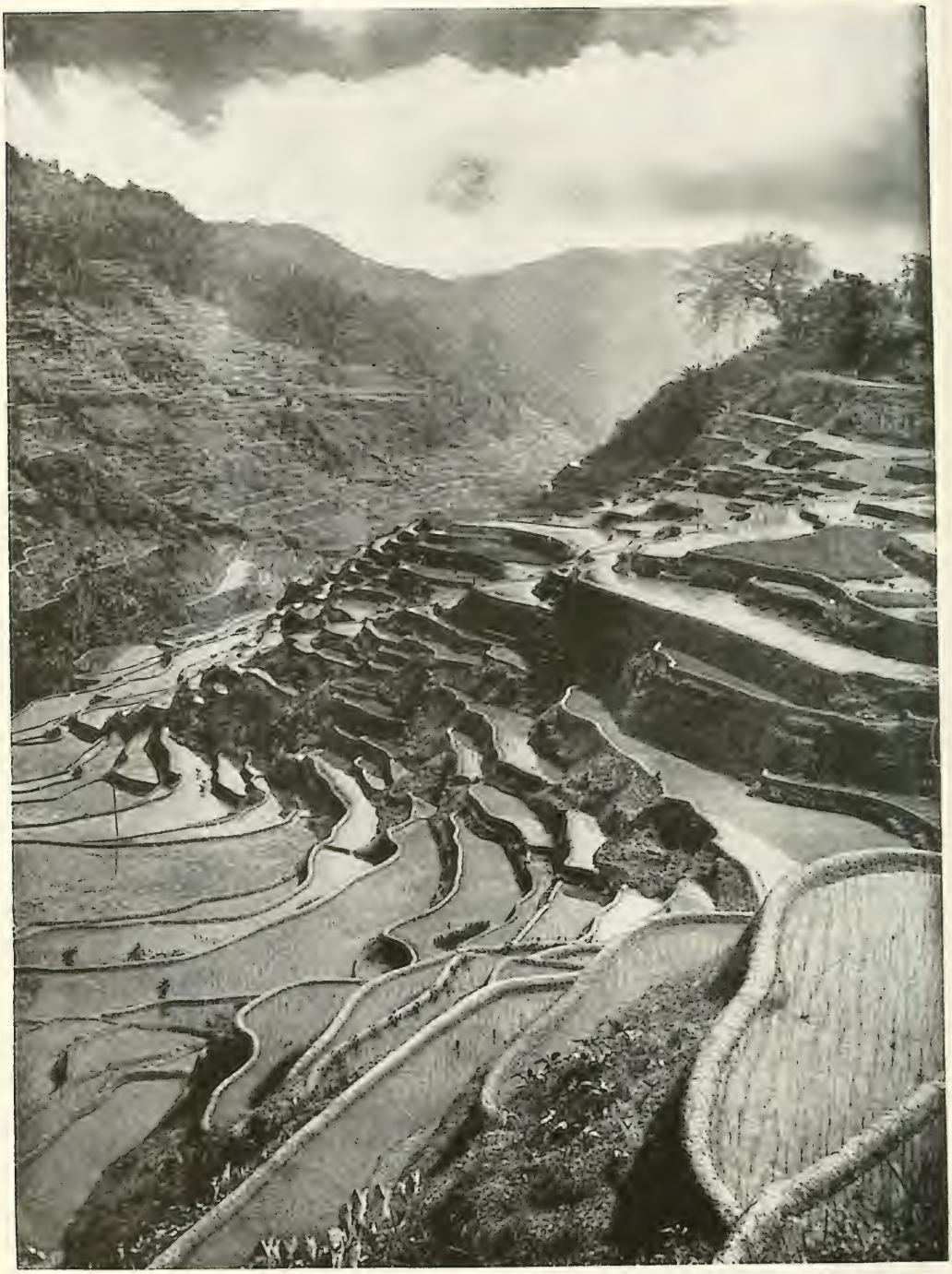
I once attended the funeral of an

A MOUNTAIN SIDE TERRACED AND IRRIGATED BY HEAD-HUNTING IFUGAOS

Their irrigating ditches run for miles along nearly perpendicular mountain sides, and wonderful rice terraces extend upward on steep slopes for thousands of feet (see text, page 882)

IFUGAO RICE TERRACES AT HARVEST TIME

Note the village in the midst of the terraces in the upper part of the picture. The savages, who display such skill and patience in building these terraces, were ruthless head-hunters



IFUGAO RICE TERRACES AT PLANTING TIME

The Ifugao may be a barbarian, but he is also an excellent engineer

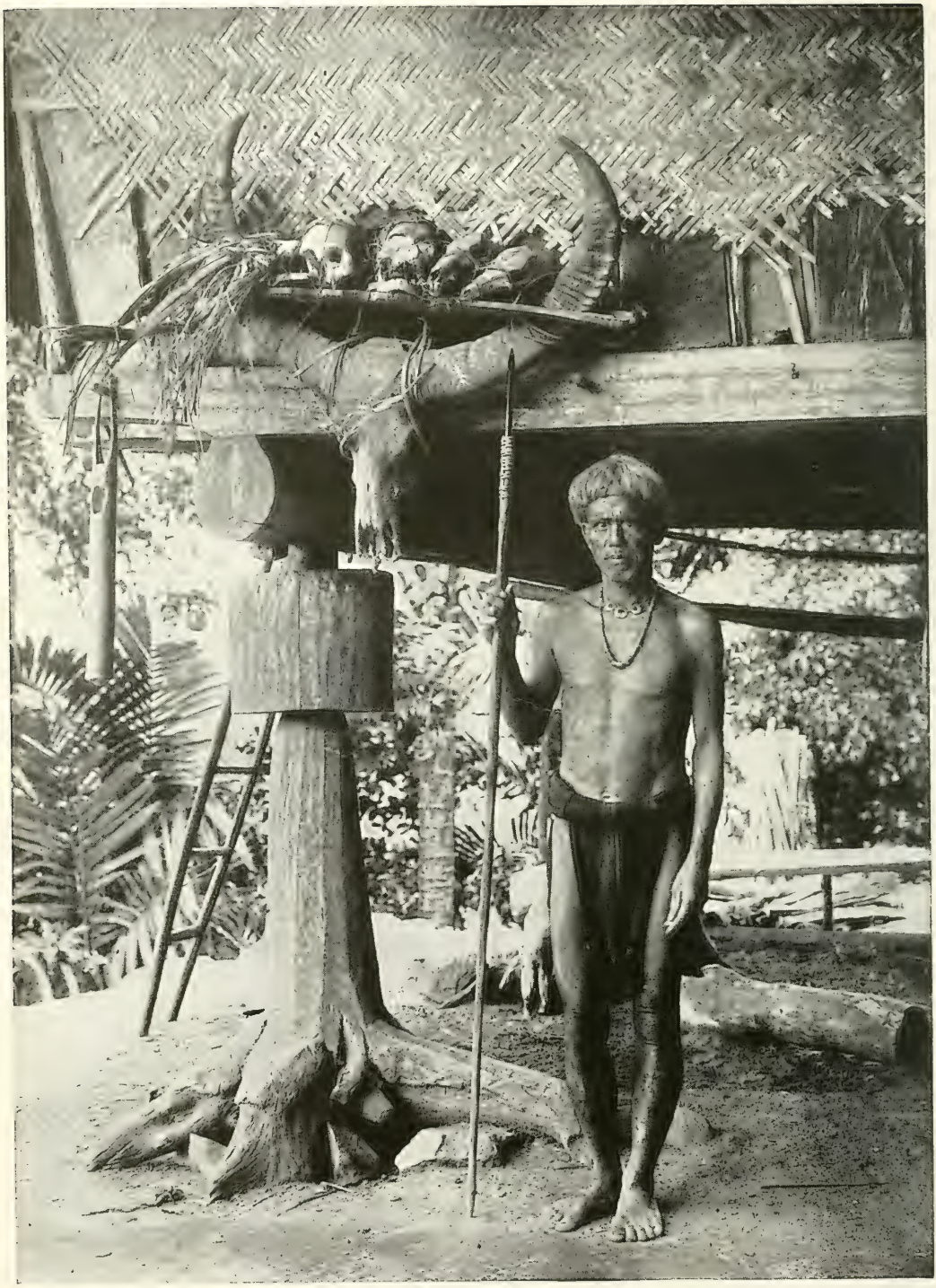
A TYPICAL IFUGAO RICE PADDY WALL, SHOWING STEPS USED IN ASCENDING TO TERRACES ABOVE (SEE PAGE 882)

Ifugao who had lost his head. He was borne to his grave on his shield, which was suspended from a pole by means of rattans. The shield had been split in the fight which cost him his life. His body was covered with gaping wounds.

The mourners followed in single file, the men carrying black shields with zigzag white marks painted on them. An old man at the head of the column beat a series of tattoos on a piece of resonant wood. The other men repeated his performances exactly, in each case drumming on their shields with pieces of wood. When the open grave was reached the body was deposited on the ground. The neighbors shouted to the spirit of the dead man, asking him why he had been careless enough to get himself killed, and why he had left his poor old mother and a house full of rice and tobacco. Even the gray-headed mother herself berated her careless son. Presently the men produced a death blanket, in which they chopped holes with their war-knives, at the same time assuring the dead man that they would serve his enemies as they were serving the blanket. The blanket was then used to bind his hands and arms against his body, which was then promptly buried, the site of the grave being marked with white head-dresses which had been worn to the funeral and which were tied in a bunch to a pole placed over the mouth of the grave.

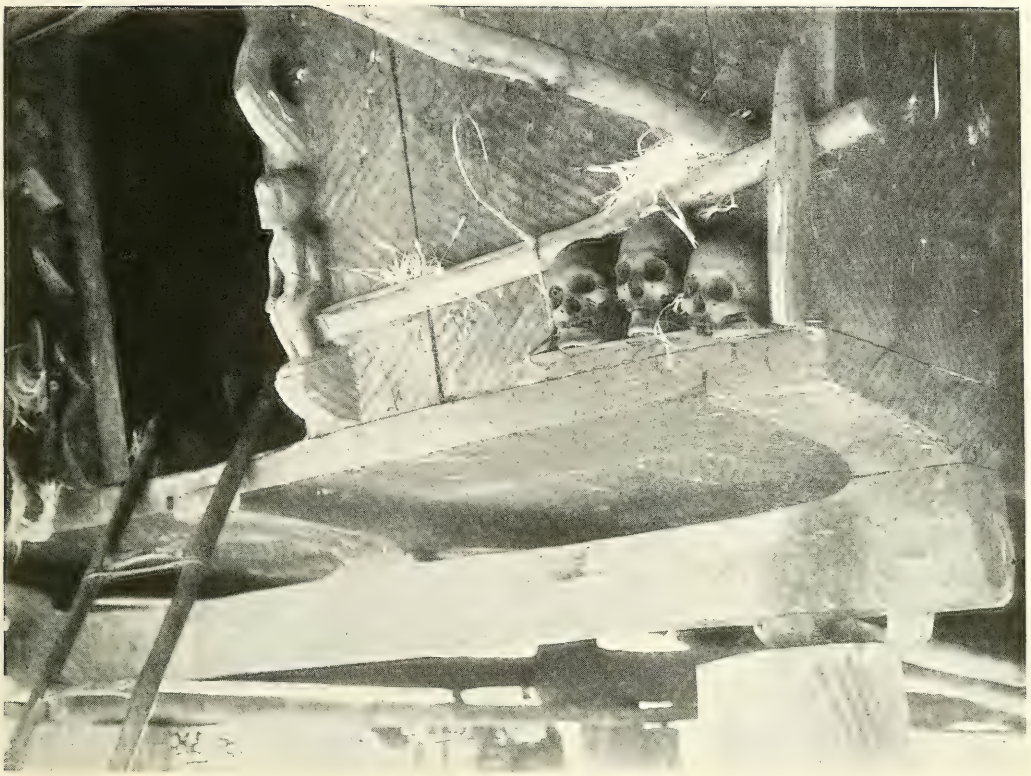
THE BONTOC IGOROTS

The Bontoc Igorots inhabit a subprovince in central northern Luzon which bears the name of the tribe. They num-



AN IFUGAO HEAD-HUNTER WITH SOME OF HIS TROPHIES

Evidently in the opinion of this warrior, "Heads is heads," whether human or animal (see page 889)



IFUGAO TROPHIES

A small but select collection of former enemies. Note the image which the Ifugao has rudely carved as a decoration for his door (see page 889)

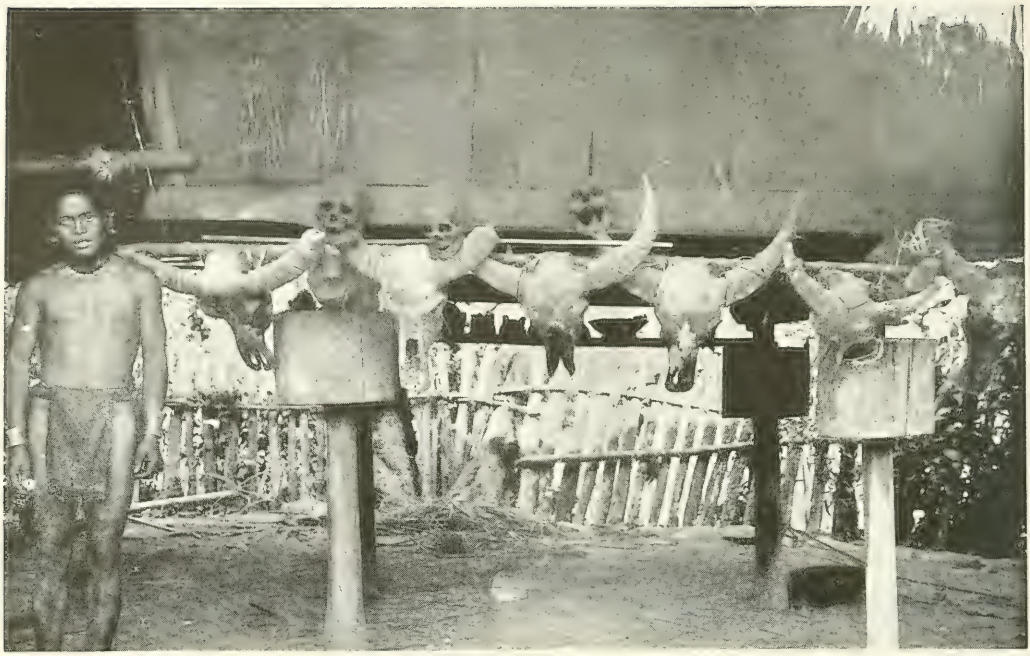
ber some 76,000 souls. Like the Kalingas and Ifugaos, they have until recently been inveterate head-hunters. Indeed, they still take some human heads each year, although the number is now very small. They are physically a wonderfully developed people, as tall as the Kalingas and on the average more heavily built than either the Kalingas or the Ifugaos.

The men tattoo freely their chests and arms, and often their faces and backs as well. Formerly only those who had participated in successful head hunts were allowed to tattoo, but this rule is no longer strictly adhered to. Their clothing is usually limited to small, dingy, unornamented clouts, and sometimes even to small aprons, although a good many of them have cotton blankets, which they use to protect themselves against wind and rain. They wear few ornaments.

Very many of them produce huge holes in the lobes of their ears, first cutting a small opening into which pieces of wood the size of tooth-picks or matches are forced, stretching it little by little until it becomes an inch or more in diameter. Ear plugs or other ornaments are placed in the openings thus formed, which incidentally serve as depositories for cigars and other small objects. Indeed, I have more than once seen a man roll up a pack of playing cards and put it, for safe keeping, in the hole in his ear!

The men are also particularly fond of pearl-oyster shells ornamented with scratch-work patterns. These they usually fasten at their waists. Brass tobacco pipes are often thrust into the hair, which is "banged" on the forehead but allowed to grow long behind, where it is usually confined in a jaunty cap beautifully woven from scarlet, yellow, and brown or black rattan.

Dogs are a favorite article of food with these people, and necklaces made of



AN IFUGAO HEAD-HUNTER

His house has an ornamental frieze of skulls running around it at the height of the floor, of which he is very proud

dog's teeth or of crocodile's teeth are much in vogue.

The dress of the women almost invariably consists of a narrow skirt reaching from the waist, where it is fastened by a girdle, to the knee, and open up one side. Upper garments are practically unknown except in regions where the inhabitants have come much in contact with Filipinos. Women commonly tattoo the arms and hands only. They have ear ornaments similar to those of the men, and wear necklaces made of dog's or crocodile's teeth, brightly colored seeds, and beads.

They do not cut the hair, but allow it to grow long. Some of them wear large switches made of hair from their dead ancestors.

WELL-FASHIONED WEAPONS

The Bontoc Igorots not only fashion well-shaped head-axes and lances, but make and burn good earthen pots and artistic clay pipe-bowls. The people of Mayinit make salt; those of Samoqui make excellent earthen pots. The women of a number of towns near the Lepanto border weave blankets, and many of the other women make strong, serviceable cloth from thread of twisted bark fiber. Some of the men cast and finish rather elaborate brass pipe-bowls, and there are some other small manufacturing industries.

A number of distinct types of houses are to be found among the Bontoc Igorots, and this is not to be wondered at, as their territory abuts on that of the Lepanto Igorots on the southwest and upon that of the Tingians and Kalingas on the west and the north. From the Ifugaos on the east they are separated by a high mountain range. Along the borders of their territory their houses resemble more or less those of the neighboring tribes, but the commonest type of house has a fairly high roof, within which is a storeroom, and is without sides, the floor being of dirt and inclosed by a low wall of boards, resembling a tight board fence. This does not reach up to the overhanging roof. The house is entered by a sort of gate at one end.

There are two stalls separated by a low partition on the left. In one of these

AN IFUGAO ANITO IMAGE AROUND WHICH DANCES ARE HELD

The carving is quite crude, but they are very particular about the head dress

food is prepared and in the other it is cooked. To the right there is a bench for the accommodation of the family, when they wish to sit rather than squat, and extending across the end opposite the entrance there is a boxlike structure perhaps 2½ or 3 feet high and 3 feet wide. This is the sleeping-box, to which access is had by means of a low door. At one end of it there are usually loose boards on the ground.

Father, mother, and children crawl into this suffocating place at night, and, after building a fire on the dirt at the further end of the box, sleep on the boards, or attempt to do so. It is hardly to be wondered at that eye diseases are very prevalent among the Bontoc Igorots.

Their houses are grouped in large villages, and their occupants depend for protection upon their large forces of fighting men rather than upon inaccessibility.

DOMESTIC ANIMALS

The Bontoc Igorots are naturally a dirty people. Both their persons and their houses are usually filthy. They keep dogs, hogs, and chickens. The hogs are provided with pens consisting of depressions in the ground walled up with stone. Connected with these there are good houses, which afford the swine excellent protection against inclement weather. Pork is eaten only on ceremonial occasions, and hogs are carefully

AN UNLUCKY IFUGAO HEAD-HUNTER WHO LOST HIS OWN HEAD AND THEREBY BROUGHT DISGRACE UPON HIS FAMILY AND VILLAGE

Secretary Worcester attended this man's funeral (see text, page 893)

BURIAL OF AN IFUGAO WHO HAS LOST HIS HEAD

To lose one's head is considered a terrible family disgrace, so that the burial of the offender is a most unceremonious affair (see page 889)

fed in stone or wooden troughs. Most of the house refuse goes into the hog-pens, and, with the accumulated manure, is ultimately carried out to fertilize the rice fields.

Not a few wealthy Igorots own carabaos in considerable numbers. They never use them for draft animals, but allow them to run half wild until they are wanted for food on ceremonial occasions. Chickens are also eaten only in connection with religious or semi-religious ceremonies.

Like the Ifugaos, the Bontoc Igorots are fairly capable, hard-working agriculturists. They make the bare mountain sides yield them a reasonably abundant supply of vegetable food, building wonderful systems of irrigated rice terraces in places where water is to be had, and planting yams where water is not available. They also grow limited quantities of millet, beans, and corn.

A SAVAGE BUREAU OF FORESTRY

Curiously enough, the Bontoc Igorots have forest laws and a forest service of their own. The mountain sides of their rough country are sparsely timbered with pine, which has grown very scarce near

BANGAD, A BONTOC IGOROT TOWN

On the steep mountain sides above are rice terraces or fields of camotes, or yams, that yield large crops

A BONTOC IGOROT TOWN, WITH A VIEW OF THE ADJACENT RICE TERRACES

Their houses are grouped in large villages and their occupants depend on their superior number of fighting men rather than inaccessibility

(see page 897)

VIEW OF A SECTION OF A BONTOC IGOROT IRRIGATION DAM LAID UP WITH DRY STONES

They are capable agriculturists, building wonderful systems of irrigated rice terraces (see page 899)

BONTOC IGOROT WORKERS BRINGING IN RICE-HEADS

They harvest their rice, as do the hill people of other tribes, by cutting the heads one at a time, and the crop is often very large

BONTOC IGOROTS BRINGING IN CAMOTES

When laboring in mud and water, in planting time, both sexes frequently go about entirely nude, a condition not observed among any other tribe in the Philippines

some of the larger settlements. Forests in the vicinity of such settlements are divided up into small private holdings claimed by individuals, whose right thereto is recognized by the other members of the tribe. In many places it is forbidden to cut trees until they have reached a large size, although the lower branches are constantly trimmed off and used for firewood. Forest fires are kept down to facilitate reforestation, and on occasion young trees are planted. Such foresight on the part of a primitive people is certainly unusual.

BONTOC IGOROT WOMEN

They are bringing in camotes, or yams, which have been laboriously dug up with sharpened sticks

The Bontoc Igorots are only just now learning the use of agricultural tools. Heretofore they have performed most of their agricultural operations with their own hands and feet and with sharply pointed sticks. They harvest their rice, as do the hill people of the other tribes, by cutting the heads one at a time.

When laboring in the mud and water in the rice fields at planting time, or when obliged to be out in the rain, both men and women often go stark naked, a condition of things which I have not observed among the people of any other tribe in the Philippines. The women commonly wear skirts of leaves while performing field work, thus saving wear on their highly prized cloth skirts.

Their towns are divided into what we should perhaps call wards, and in each division there is usually a group of buildings, consisting of a long, low dormitory for girls and unmarried women or widows; a second for young boys, unmarried men, and widowers, and a sort of men's clubhouse. The people who sleep at home are ordinarily the fathers, mothers, and very young children. All others go to the above-mentioned public dormitories. In addition there is an open stone court from which a long two-room building extends. The room nearest the court opens directly upon it, the outer end being without a wall. It serves as a sort of men's clubhouse. Here all important public events are discussed. The second room is dark. Access to it is had through a very narrow door at the side and only the elect may enter. It is used as a depository for the skulls of enemies

A TYPICAL BONTOC IGOROT HOUSE

A number of distinct types of houses are to be found among these people, due to the fact that their territory abuts that of several other tribes, so they frequently adopt the style of their nearest neighbor. Note the firewood under the eaves (see page 806)

A BONTOC IGOROT HEAD-HUNTER CARRYING FERTILIZER OUT TO HIS RICE FIELD

They are untiring workers and seem to have a well-established idea of land cultivating

(see page 899)

A GROUP OF BONTOC IGOROT WOMEN IN TYPICAL DRESS

Their one garment is a narrow skirt reaching from waist to knee and open up one side. Upper garments are practically unknown except where they come much in contact with the Filipinos (see page 896)

killed by the people of the ward. In the open court above referred to there may be a tree growing, but if there is not a live tree its place is usually taken by one that has been cut off and stuck into the ground. In either event some of the branches which extend directly upward are cut off, leaving sharp prongs, on which may be impaled the heads brought in by successful war parties.

WELL-REGULATED WARFARE

The Bontoc Igorots are perhaps more courageous and manly in their fighting than are the people of any other Philippine hill tribe. They have regular ceremonies for making peace and declaring war. On occasion the people of one town send word to the people of another that they are going to attack on a given day. At other times enemies meet by appointment at designated places and fight over fancied wrongs.

Heads are removed with heavy head-axes, which lack the graceful form of the axes of the Kalingas, but are perhaps more formidable, as their cutting edges are considerably longer. The strong and well fashioned, wickedly barbed steel lances, which the Bontoc Igorots throw with much force and skill, are very formidable weapons at short range. Their shields are stout affairs of wood lashed with rattan. They are fashioned in various more or less artistic shapes, which show a distinct advantage over that of the shields of the Ifugaos, but they are inferior, in appearance at least, to those of the Kalingas.

When a successful war party returns with heads there is great rejoicing. The gory trophies are stuck up in the courts of the wards where dwell the men who took them, and there ensues a *cañao,* accompanied by much drinking and feast-

BONTOC IGOROT WOMEN IN WORKING DRESS

The women sometimes wear skirts of leaves when engaged in field work (see text, page 905)

A BONTOC IGOROT

His most cherished decoration is the key which is hung about his neck

BONTOC IGOROT TYPE

The tattooing is not unusually elaborate. They frequently decorate their faces and back in a like manner

ing. The duration of the celebration depends on the wealth of those who give it. These people believe that the *anito*, or spirit, of a person who has lost his head can make trouble for those who killed him, but that such a spirit profits by the food and drink consumed by the living at the feast given in honor of the taking of the head; so there is a double reason for making head-taking feasts as elaborate and as long as possible.

CARE OF HEADS

After the feasting is over the heads are taken down and boiled and the skulls thoroughly cleaned. The lower jaws are used for *gansa* handles and the skulls are buried in the earth in the secret rooms above referred to. At the expiration of a year they are dug up with appropriate ceremonies, and are then hung in baskets from the ridge-poles of these chambers.

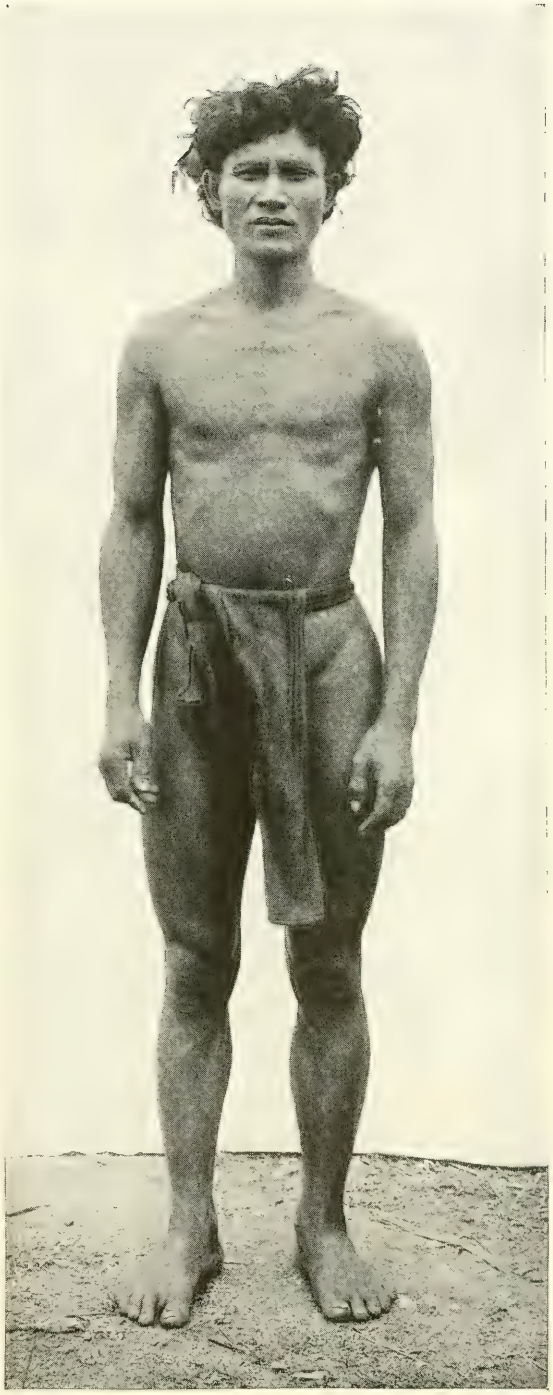
As with the Ifugaos, a man who loses his head is considered to have brought discredit on his town. He is sometimes buried under a trail, so that his neighbors may walk over him! Participants in successful head-hunting raids are allowed to tattoo their bodies and more especially their faces.

A man or boy who has taken a head finds it comparatively easy to get an acceptable wife, and the influence of women is one of the potent factors which has rendered difficult the complete suppression of head-hunting among these people.

THE WILD TINGIANS OF APAYAO

Many of the Tingians of northern Luzon, although they are non-Christians and cling tenaciously to their ancient religious beliefs, are in other respects quite as highly civilized as their Christian Filipino neighbors.

Representatives of this tribe are found in North and South Ilocos, and even in Lepanto and Nueva Ecija, but the Tingian strongholds are the subprovinces of Abra and Apayao.



AGPAD, A BONTOC IGOROT WARRIOR

This man has saved two Americans from drowning. He was formerly a famous head-hunter

A TILLER OF THE SOIL

This Igorot has worked on the precipitous mountain sides until his prehensile toes have become almost deformed

Men and women are of medium size and have clean, well-developed bodies. The men let their hair grow long, binding it up on their heads with strips of cloth or handkerchiefs. Many of them are possessed of shirts and trousers, which they wear on state occasions, usually going back to their clouts, however, if there is any hard work to be done.

PECULIAR IDEAS OF PERSONAL BEAUTY

The women of this tribe ornament their arms with series of bracelets and armlets, which often extend from wrist to shoulder. They constrict the middle of the forearm during early girlhood and continue to wear tight armlets on the constricted portion throughout life, so that their forearms become somewhat hourglass-shaped, this being considered a mark of great beauty in spite of the unsightly swelling of the wrists which results.

In the more remote villages upper garments are not ordinarily worn by women and girls, but this rule does not hold for

FEET OF A BONTOC IGOROT

Showing the effect of constantly working up and down very steep hillsides. The natives are just learning the use of agricultural implements, heretofore performing much of the labor with their hands, feet, and pointed sticks (see page 905).

the towns near the Christian territory, where a modified form of the *camisa* of the Filipino women has been almost universally adopted. The garment is, however, sleeveless, or has very short sleeves, in order that the ornamented arms of the wearers may not be concealed.

The more civilized Tingians are a remarkably cleanly and an extraordinarily law-abiding and peaceful people. Their well-built houses are placed on high, sanitary sites. Their cooking utensils are taken to the river and scrubbed with sand after every meal. If a wife offers her husband dirty or soggy rice to eat, the offense is said to afford ground for divorce.

The people of this tribe are skillful agriculturists, raising yams, rice, corn, and tobacco in considerable quantity. They also grow a good deal of cotton, and the women are quite skillful in spinning it into thread and weaving it into cloth.

Horses and cattle are raised for sale, and in considerable numbers, and many Tingian families are quite well off.

In view of the brief account above given, the question may well be asked, Why are the people of this gentle, industrious, law-abiding tribe included among the head-hunters?

WHY THEY ARE WARLIKE

In the vicinity of Balbalassan, where until recently they have had to fight for their lives against the Kalingas and the Bontoc Igorots, they have either retained some of their own ancient and well-nigh forgotten warlike customs or have acquired those of their neighbors. At all events, they show courage and skill in the use of lances, head-axes, and shields, and are said on occasion to decapitate the enemies whom they slay. This, however, is not the real reason for listing them as head-hunters.

In the territory now included in the

A YOUNG BONTOC IGOROT GIRL

Making cord from bark fiber. The cord will ultimately be woven into cloth. Note the decoration in the lobe of her ear (see text, page 896)

subprovince of Apayao, into which the Spaniards were never able to penetrate, there dwells a population of some 53,000 souls who have in the past been variously referred to as "Apayaos," "Igorotes," and "Kalingas." They are not Kalingas, nor do they seem to be worthy of any distinct tribal designation. It is believed that they have a common origin with the more civilized Tingians, and that they are today in substantially the same stage of civilization as were the Tingians of Abra 200 years ago. They are now just being brought under governmental control and comparatively little is known of their head-hunting customs.

They are people of medium stature. Many of them are slenderly and gracefully shaped. The men usually wear very large clouts, which are dyed a light indigo blue. They also wear short jackets of gay cloth similar to those worn by the Kalingas. Around their heads they wind turbans with alternating bands of bright scarlet and yellow. The men "bang" their hair low over their eyes, but otherwise do not cut it. Indeed, they supplement the natural growth by adding switches, after the manner of the women of other tribes. Their most characteristic ornaments are elaborate groups of pendants made from mother-of-

A YOUNG BONTOC IGOROT WOMAN

Note the enormous hole in the lobe of the ear. To bring this about a small opening is first cut, into which tiny pieces of wood are forced, gradually increasing in size until the hole becomes an inch or more in diameter (see page 895).

A BONTOC IGOROT POTTER

This tribe not only fashion well-shaped head-axes and lances, but make and burn serviceable earthen pots and artistic clay pipes (see page 896)

AN OLD BONTOC IGOROT WOMAN

Owing to hard work in the fields, much of which is done by the women, they age very rapidly

BONTOC IGOROT SENTRIES WATCHING A TRAIL

These people are perhaps more courageous and manly in their fighting than any other Philippine hill tribe, having regular ceremonies for making

A BONTOC IGOROT CLIMBING A HUGE TREE-FERN

Because of their strength and distorted feet, they climb trees with remarkable agility

WILD TINGIAN HEAD-BASKETS

There were 58 of these bamboo baskets placed in two long rows on both sides of the trail giving entrance to the town of Magapta, Apayao. Each contained half a cocoanut shell, in which was a fragment of a human head (see page 930)

THE HOUSE OF A WILD TINGIAN, TAUIT, APAYAO

Their well-constructed houses are built upon high sanitary sites and are kept remarkably clean (see page 913)

THREE WILD TINGIAN CHIEFS

Photograph taken at Magapta, Apayao. Note the big breast ornaments of mother-of-pearl worn by the man at the left

A WILD TINGIAN MOTHER AND CHILD

The women of this tribe are celebrated for their high moral tone. The affection between husband and wife is deep and lasting (see page 927)

A WILD TINGIAN FAMILY OF TAUIT, APAYAO

The man is Buñad, a famous fighting chief, the hero of a thousand battles, who has since died of a snake bite

A WILD TINGIAN GIRL

These women differ from those of all other head-hunting tribes in never exposing the upper part of their bodies except when in mourning. They are inordinately fond of bead necklaces and of such large silver ear ornaments as are shown in the photograph.

pearl and suspended from necklaces in such a way as to hang on their chests. Their shields are of a peculiar and highly characteristic form, and are almost invariably painted black, red, and yellow in accordance with a conventional color scheme, which is substantially the same in every instance. They use lances with long and very slender heads. Their head-axes in many cases more nearly resemble corn-knives than the axes of the Bontoc Igorot or the Kalingas. A few of the men know how to work iron and steel.

DIFFERENT IDEAS OF DRESS FOR WOMEN

The women wear short skirts, and upper garments. They differ from the women of all other Philippine head-hunting tribes in being scrupulously careful about exposing the upper part of the body, except when they are in mourning.

Many of their ornaments are like those of the men, and they are inordinately fond of bead necklaces and of large silver ear ornaments of peculiar form. A blue thread tied tightly around the ankle is a sign that the wearer is unmarried.

These wild Tingians live in small villages in immediate proximity to rivers and streams. It has proved excessively difficult to suppress head-hunting among them, for the reason that it is intimately connected with their religious beliefs.

GIANT SUGAR-CANE RAISED BY THE WILD TINGIANS OF DALLAOAS

The stalks of two plants proved quite strong enough to support a hammock containing a heavy man

When a man dies, whether his death be natural or due to violence, the other members of his family repair by night to some village of their enemies, cut pieces from their turbans, and throw them down on the ground. This is interpreted as an intimation that they will return and take heads some time within six months, and they believe that the dead man knows no peace until this is done.

THE ONLY CURE FOR A WIDOW'S GRIEF

A widowed wife starves herself for days, discards her upper garment, and may not bathe during a period of six months unless the men of the family sooner succeed in taking a head. During the entire period of mourning, which is supposed to end when a head is taken, she gives away to hysterical fits of weeping and shrieking, which last for hours.

The women of this tribe are celebrated for their chastity, and the affection between husbands and wives is undoubtedly deep and lasting. Their mourning is in many cases the result of genuine sorrow, rather than of the necessity for the perfunctory carrying out of a time-honored ceremonial.

Many a night have I lain and listened to some poor woman, half a mile away, who called to her departed husband from dusk to daylight with hardly a moment's intermission. These faithful women often refuse to refrain from outward manifestations of grief after the prescribed period of mourning has passed, but continue to call for their husbands, and I know of no more pathetic thing than their long-continued efforts to bridge the mysterious gulf which separates them from those whom they have loved, ending, as not infrequently happens, in their own death or in madness.

Of the ceremonies which attend the return of a war party with heads, we at present know little, except that the heads are ultimately chopped into pieces, one of which is given to each member of the war party, who thereupon places it in

AN INHABITANT OF "NO MAN'S LAND"

Note his feathered head ornaments and his gracefully shaped head-axe. The men are noted for their superb physical development.

A YOUNG WOMAN OF "NO MAN'S LAND," SHOWING TYPICAL TATTOOING AND ORNAMENTAL HEAD DRESS

Intermarrying with near-by tribes is shown in a blending of both physical characteristics and racial customs

TWO MEN OF "NO MAN'S LAND," SHOWING TYPICAL DRESS AND ORNAMENTS

These people are the last to come under government control, and isolated cases of head-taking still occur among them (see page 930)

half a cocoanut shell, which in turn is put in a bamboo basket and set up beside one of the several entrances to the town.

It is believed that evil spirits cannot pass these rows of head-baskets, the number of which indicates only too plainly that head-hunting is still common in many parts of Apayao.

THE PEOPLE OF NO MAN'S LAND

In the vicinity of Lubuagan there is a peculiar "No Man's Land," where meet the regions inhabited by the Tingians, the Kalingas, the Ifugaos, and the Bontoc Igorots. There has been intermarriage between members of the several tribes, resulting in a blending of physical characteristics and racial customs, and it is often difficult to state with any degree of certainty to what particular tribe, if any, the people of a given town belong.

Like their neighbors, the inhabitants of this region are skilled agriculturists, raising rice and yams on the steep mountain sides, and cultivating sugar-cane with much care. Their houses resemble the houses of the Kalingas more than those of the Bontoc Igorots. The women have adopted some articles of dress from the Kalingas and others from the Tingians. They are apparently indebted to the latter for the huge "form improvers," worn under their skirts around the lower abdomen and over the hips. In some cases they wear upper garments, but more frequently they do not. They set inordinate store by old agate beads.

PERFECT PHYSICAL DEVELOPMENT

Many of the men have a most perfect physical development. Their clouts are often elaborately ornamented with beads and buttons, and they wear coils of copper wire about their necks. Into their back hair, which is confined in little caps like those of the Bontoc Igorots, are thrust plumes of scarlet and yellow feathers, or of cock's tail feathers, having small yellow, white, or scarlet birds' feathers fastened to their tips with wax. These people are especially warlike, and among them are found some of the most famous head-hunting chiefs of northern Luzon.

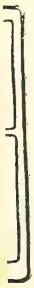
With the exception of the Tingians of Apayao, they have been the last people to come under government control, and isolated cases of head-taking still occur among them.

HEAD-HUNTING BECOMING RARE

As will have been inferred from many of the statements made in this article, head-hunting—which until recently annually cost the lives of thousands of people in northern Luzon, prevented agricultural development, and brutalized those who practiced it—has, since the American occupation, been very effectively checked. It is now entirely unknown in much of the territory where it formerly prevailed, and is everywhere exceedingly rare, except in a few remote portions of the subprovince of Kalinga, in the subprovince of Apayao, and among the Negritos inhabiting the still practically unexplored regions bordering on the Pacific coast of northern Luzon.

Although I have, in this article, sometimes allowed myself to drop into the present tense in describing the head-hunting tribes of northern Luzon, it should be remembered that unless otherwise specifically stated the conditions which I have set forth are those which existed when Americans first came in contact with these peoples. In a future article I shall tell of some of the changes which it has proved possible to bring about.

Meanwhile let it be remembered that the peculiar, and sometimes highly objectionable, customs which have prevailed, or still prevail, among the million non-Christian inhabitants must not be credited to the Filipinos, the civilized and Christianized inhabitants in the Philippines, of whom there are some seven millions.



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THE NATIONAL GEOGRAPHIC MAGAZINE

MAP OF CHINA AND ITS TERRITORIES

PREPARED BY J. G. BARTHOLOMEW—GILBERT H. GROSVENOR, EDITOR.

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VOL. XXIII, No. 10 WASHINGTON OCTOBER, 1912

THE NATIONAL GEOGRAPHIC MAGAZINE

THE WONDERFUL CANALS OF CHINA

By F. H. KING

No more important practical contribution to geographic knowledge has been published in many years than "Farmers of Forty Centuries," by the late Prof. F. H. King. It is a study by one of America's foremost agriculturists of the methods by which the Chinese support nearly 500 million people on an area smaller than the improved farm lands of the United States, and on land that they have tilled unimpaired for four thousand years. Dr. King unfortunately died when his book was completed, but the work has been published privately by Mrs. King, at Madison, Wisconsin (450 pages and 250 illustrations, $2.50). The following article has been abstracted from the book and all the photographs are from the same source.

IT IS well nigh impossible by word or map to convey an adequate idea of the magnitude of the systems of canalization, delta, and other lowland reclamation work or of the extent of surface fitting of fields which have been effected in China, Korea, and Japan through the many centuries and which are still in progress. The lands so reclaimed and fitted constitute their most enduring asset and they support their densest populations.

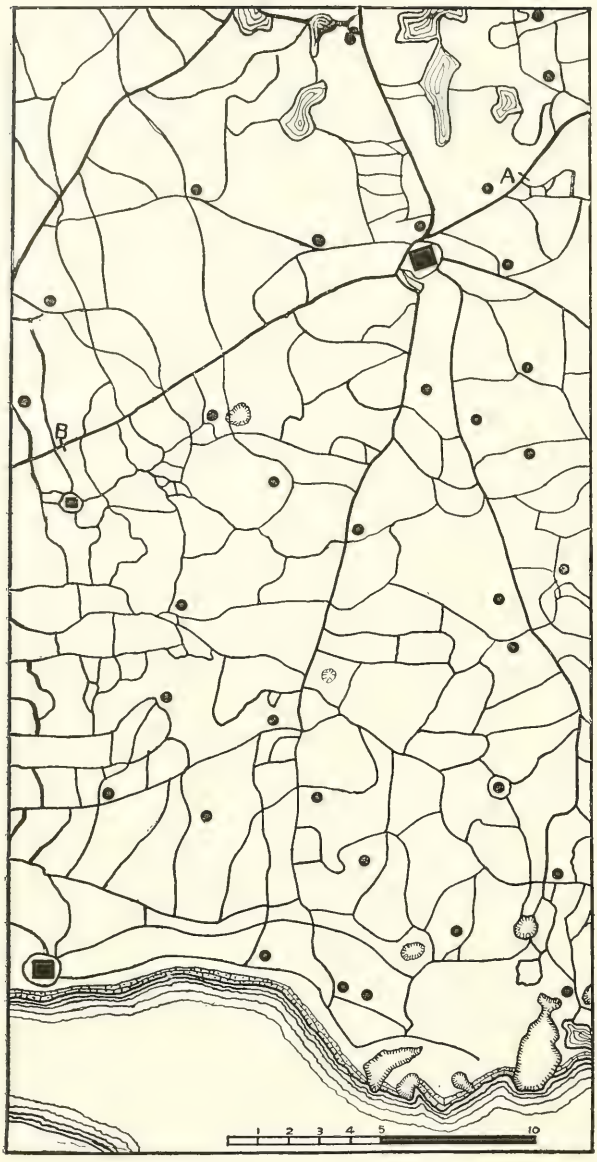
Forty canals across the United States from east to west and 60 from north to south would not equal in number of miles those in these three countries today. Indeed, it is probable that this estimate is not too large for China alone.

In one of our journeys by house-boat on the delta canals between Shanghai and Hangchau, in China, over a distance of 117 miles, we made a careful record of the number and dimensions of lateral canals entering and leaving the main one along which our boat-train was traveling. This record shows that in 62 miles, beginning north of Kia-hsing and extending south to Hangchau, there entered from the west 134 and there left on the coast side 190 canals. The average width of these canals, measured along the water line, we estimated at 22 and 19 feet, respectively, on the two sides. The height of the fields above the water level ranged from 4 to 12 feet during the April and May stage of water.

The depth of water after we entered the Grand Canal often exceeded 6 feet, and our best judgment would place the average depth of all canals in this part of China at more than 8 feet below the level of the fields.

On map No. 1 (page 932), representing the area of 718 square miles in the region traversed, all lines shown are canals, but scarcely more than one-third of those present are shown on the map. Between A, where we began our records before reaching Kia-hsing, and B, near the left margin of the map, there were 43 canals leading in from the up-country side instead of the eight shown, and on the coast side there were 86 leading out into the delta plain toward the coast, whereas but 12 are shown.

Again, on one of our trips by rail from Shanghai to Nanking, we made a similar record of the number of canals seen from the train close along the track, and the notes show an occurrence of 593 canals in a distance of 162 miles, an average of more than three canals per mile



MAP NO. 1.—MAP OF MAIN CANALS IN 718 SQUARE MILES OF CHEKIANG PROVINCE

Each line represents a canal, but scarcely more than one-third of those present are shown on the map

for this region and that between Shanghai and Hangchau.

The extent, nature, and purpose of these vast systems of internal improvement may be better realized through a study of the next two sketch maps. The first (map No. 2, page 933) represents an area 175 by 160 miles, of which map No. 1 is the portion inclosed in the small rectangle. On this area there are shown 2,700 miles of main canals, but from our personal observations it is probable that there exists today in the area not less than 25,000 miles of canals.

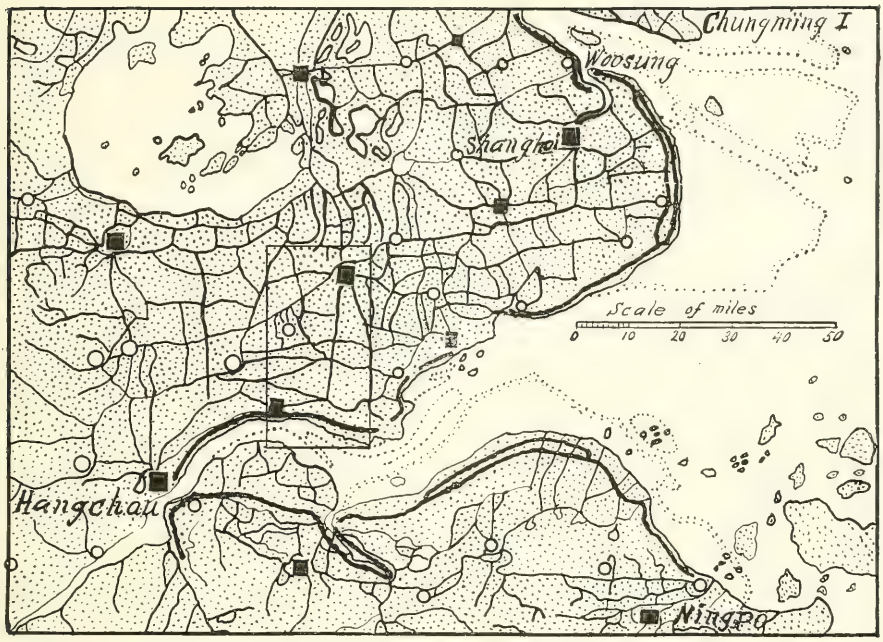
THE FAR-REACHING TIDES

In the next illustration (map No. 3, page 934) an area of northeast China 600 by 725 miles is represented. The unshaded land area covers nearly 200,000 square miles of alluvial plain. This plain is so level that at Ichang, nearly 1,000 miles up the Yangtse, the elevation is only 130 feet above the sea. The tide is felt on the river to beyond Wuhu, 375 miles from the coast. During the summer the depth of water in the Yangtse is sufficient to permit ocean vessels drawing 25 feet of water to ascend 600 miles to Hankau, and for smaller steamers to go on to Ichang, 400 miles further.

The location in this vast low delta and coastal plain of the system of canals already described is indicated by the two rectangles in the southeast corner of the sketch map 3, on page 934). The heavy barred black line, extending from Hangchau in the south to Tientsin in the north, represents the Grand Canal, which has a length of more than 800 miles. The plain east of this canal, as far north as the mouth of the Hwang-ho in 1852, is canalized much as in the area shown in map No. 2. So, too, is a large area both sides of the present mouth of the same river in Shantung and Chi-li between the canal and the coast.

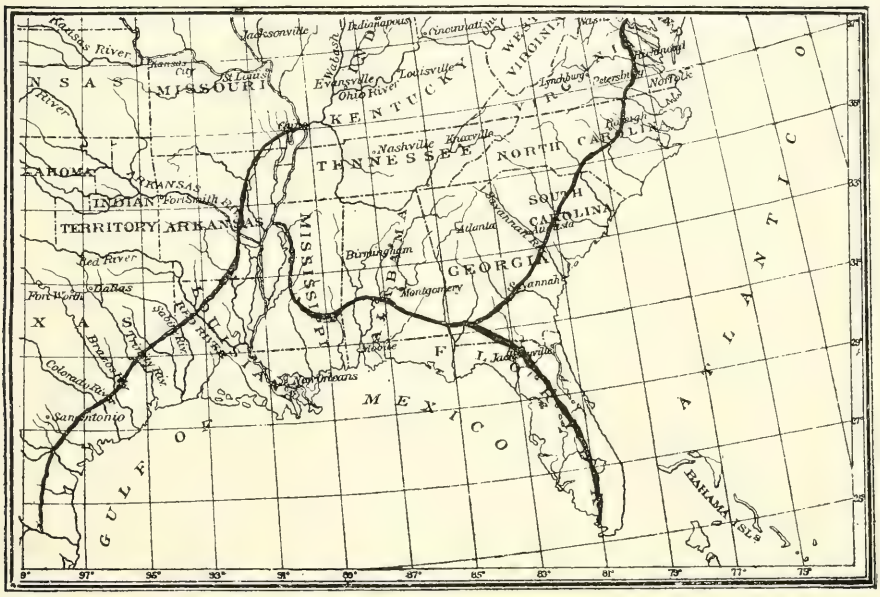
Westward, up the Yangtse Valley, the provinces of Ngan-hwei, Kiangsi, Hunan, and Hupeh have very extensive canalized tracts, probably exceeding 28,000 square miles in area. Still further west, in Szechuan province, is the Chengtu plain, 30 by 70 miles, with what has been called "the most remarkable irrigation system in China."

A conservative estimate would place

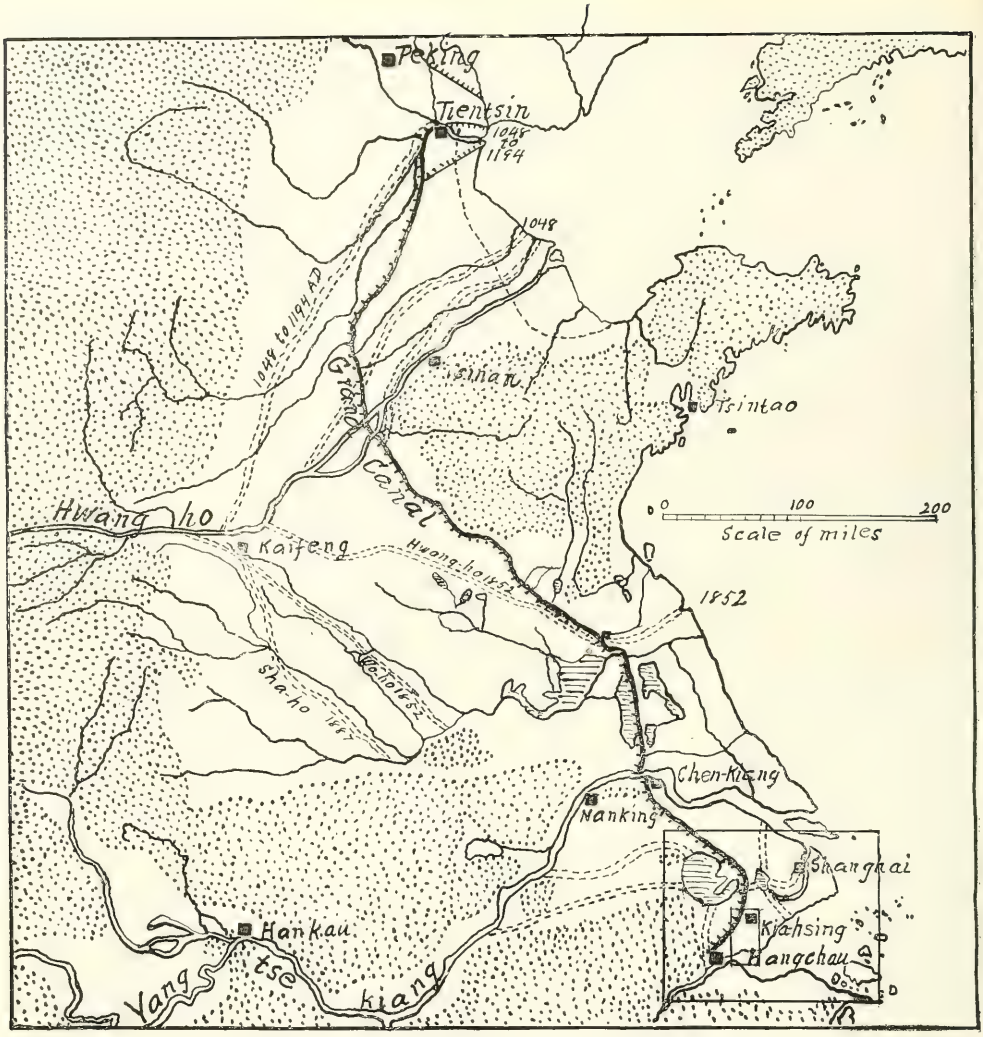


MAP NO. 2.—SKETCH MAP OF PORTIONS OF CHEKIANG AND KIANGSU PROVINCES

Representing some 2,700 miles of main canals and over 300 miles of sea-wall. The sea-walls are represented by the very heavy black lines. The area shown in this map contains not less than 25,000 miles of canals. The small rectangle shows the area covered by Map No. 1.



To build a canal in the United States to correspond with the Grand Canal of China it would be necessary to traverse the country as indicated by the black line on this map



MAP NO. 3.—SKETCH MAP OF NORTHEAST CHINA

Showing the alluvial plain and the Grand Canal, extending 800 miles through it from Hangchau to Tientsin. The unshaded land area lies mostly less than 100 feet above sea-level

the miles of canals and leveed rivers in China, Korea, and Japan equal to eight times the number represented on map No. 2—fully 200,000 miles in all.

THE GREAT LEVEES

As adjuncts to these vast canalization works there have been enormous amounts of embankment, dike, and levee construction. More than 300 miles of sea wall alone exist in the area covered by the sketch map (page 933). The east bank of the Grand Canal above Yangchau is itself a great levee, holding back the waters to the west above the eastern plain, diverting them south into the Yangtse-kiang; but it is also provided with spillways for use in times of excessive flood, permitting waters to discharge eastward. Such excess waters, however, are controlled by another dike, with canal along its west side, some 40 miles to the east, impounding the water in a series of large lakes until it may gradually drain away. This area is seen in map No. 3, above, north of the Yangtse River.

Along the banks of the Yangtse, and for many miles along the Hwang-ho, great levees have been built, sometimes in reinforcing series of two or three at different distances back from the chan-

CHINESE COUNTRY VILLAGE LINING BOTH SIDES OF A CANAL

Section one-third of a mile long between two bridges, where in three rows of houses live 240 families

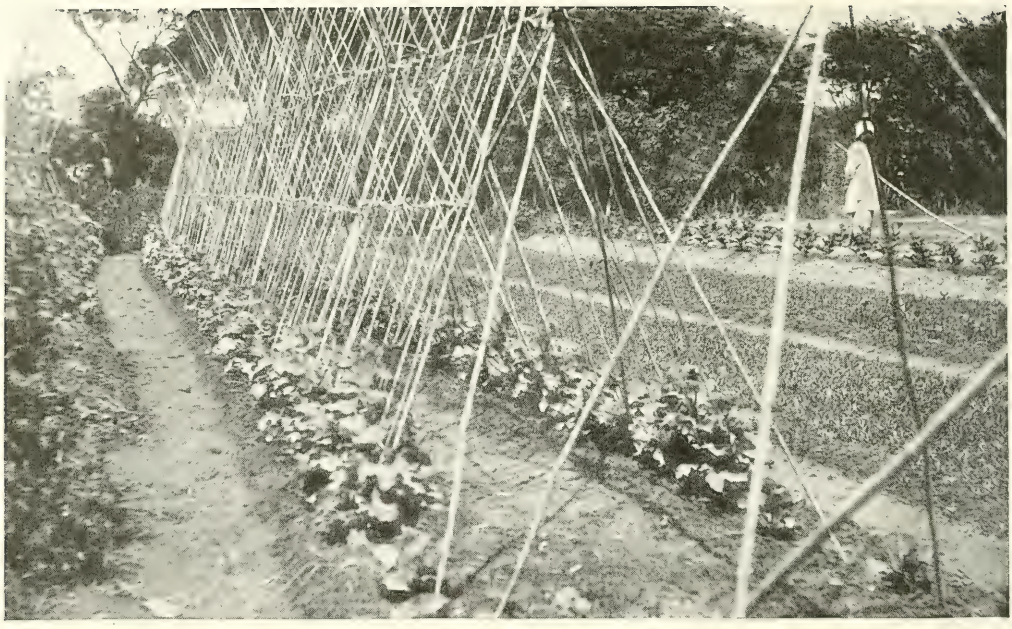
nel, where the stream bed is above the adjacent country, in order to prevent widespread disaster and to limit the inundated areas in times of unusual flood. In the province of Hupeh, where the Han River flows through 200 miles of low country, this stream is diked on both sides throughout the whole distance, and in a portion of its course the height of the levees reaches 30 feet or more.

Again, in the Canton Delta region, there are other hundreds of miles of sea wall and dikes, so that the aggregate mileage of this type of construction works in the Empire can only be measured in thousands of miles.

In addition to the canal and levee construction works, there are numerous impounding reservoirs which are brought into requisition to control overflow waters from the great streams. Some of the interior reservoirs have areas of 2,000 and 1,800 square miles, and during the heaviest rainy seasons each may rise through 20 to 30 feet. Then there are other large and small lakes in the coastal plain, giving an aggregate reservoir area exceeding 13,000 square miles, all of which are brought into service in controlling flood waters, all of which are steadily filling with the sediments brought from the far-away, uncultivable mountain slopes and which are ultimately destined to become rich alluvial plains, doubtless to be canalized in the manner we have seen.

NEW LAND IN THE MAKING

There is still another phase of these vast construction works which has been of the greatest moment in increasing the maintenance capacity of the Empire—the wresting from the flood waters of the enormous volumes of silt which they carry, depositing it over the flooded areas, in the canals, and along the shores in such manner as to add to the habitable and cultivable land. Reference may be made to the rapid growth of Chungming Island, in the mouth of the Yangtsekiang, and the million people now finding homes on the 270 square miles of newly made land which now has its canals, as may be seen in the upper margin of map No. 2.



INCREASING THE AVAILABLE SURFACE OF THE FIELD SO THAT DOUBLE THE NUMBER OF PLANTS MAY OCCUPY THE GROUND

The row of cucumbers on opposite sides of each trellis will cover its surface. This man's garden had an area of but 63 by 68 feet and two square rods of this were held sacred to the family grave mound, and yet his statement of yields, number of crops, and prices made his earning $100 a year on less than one-tenth of an acre.

The city of Shanghai, as its name signifies, stood originally on the seashore, which has now grown 20 miles to the northward and to the eastward. In 220 B. C. the town of Putai, in Shantung (see map of China, supplement), stood one-third of a mile from the sea, but in 1730 it was 47 miles inland, and is 48 miles from the shore today.

The dotted line laid in from the coast of the Gulf of Chihli on map No. 3 marks one historic shore line and indicates a general growth of land 18 miles to seaward.

Besides these actual extensions of the shorelines, the centuries of flooding of lakes and low-lying lands has so filled many depressions as to convert large areas of swamp into cultivated fields. Not only this, but the spreading of canal mud broadcast over the encircled fields has had two very important effects, namely, raising the level of the low-lying fields, giving them better drainage and so better physical condition, and adding new plant food in the form of virgin soil of the richest type, thus contributing to the maintenance of soil fertility, high maintenance capacity, and permanent agriculture through all the centuries.

AN ENGINEER-EMPEROR

These operations of maintenance and improvement had a very early inception; they appear to have persisted throughout the recorded history of the Empire and are in vogue today. Canals of the type illustrated on maps Nos. 1 and 2 have been built between 1886 and 1901, both on the extensions of Chungming Island and the newly formed mainland to the north, as is shown by comparison of Stieler's atlas, revised in 1886, with the recent German survey.

Earlier than 2255 B. C., more than 4,100 years ago, Emperor Yao appointed "The Great" Yu "superintendent of works," and intrusted him with the work of draining off the waters of disastrous floods and canalizing the rivers, and he devoted 13 years to this work. This great engineer is said to have written

FAMILY GROUP OF GRAVE MOUNDS IN CHIHLI, BETWEEN TAKU AND TIENTSIN
The largest or father grave is in the rear, those of his two sons standing next

GRAVE MOUNDS RECENTLY RESTORED AND BEARING THE STREAMER STANDARDS IN TOKEN OF MEMORIAL SERVICES

GROUP OF GRASS-GROWN GRAVE MOUNDS CARRYING THE STREAMER STANDARDS AND SHOWING THE EXTENSIVE OCCUPATION OF LAND

It is the custom in some parts of China, if not in all, to periodically restore the mounds, maintaining their height and size, and to decorate these once in the year with flying streamers of colored paper, set there as tokens that the paper money has been burned upon them and its essence sent up in the smoke for the maintenance of the spirits of their departed friends. We have our memorial day; they have for centuries observed theirs with religious fidelity. The usual expense of a burial among the working people is said to be $100, Mexican, an enormous burden when the day's wage or the yearly earning of the family is considered.

MEN FREIGHTERS GOING INLAND WITH LOADS OF MATCHES

For adaptability to the worst road conditions no vehicle equals the wheelbarrow, progressing by one wheel and two feet. No vehicle is used more in China, if the carrying pole is excepted, and no wheelbarrow in the world permits so high an efficiency of human power as the Chinese, where nearly the whole load is balanced on the axle of a high, massive wheel, with broad tire. A shoulder band from the handles of the barrow relieves the strain on the hands, and, when the load or the road is heavy, men or animals may aid in drawing, or even, when the wind is favorable, it is not unusual to hoist a sail to gain propelling power.

A COMMON MEANS OF TRANSPORT ON THE STREETS OF SHANGHAI, USED MUCH MORE FREQUENTLY BY WOMEN THAN BY MEN

FLORAL PIECES IN FLORIST'S GARDEN, HAPPY VALLEY, HONGKONG, CHINA

Trained in the form of life-size human figures, with limbs, arms, and trunk, provided with highly glazed and colored porcelain feet, hands, and head. These, with many other potted plants and trees, including dwarf varieties, are grown under outdoor lattice shelters in different parts of China, for sale to the wealthy Chinese families.

several treatises on agriculture and drainage, and was finally called, much against his wishes, to serve as Emperor during the last seven years of his life.

The history of the Hwang-ho is one of disastrous floods and shifting of its course, which have occurred many times in the years since before the time of the Great Yu, who perhaps began the works perpetuated today.

Between 1300 A. D. and 1852 the Hwang-ho emptied into the Yellow Sea south of the highlands of Shantung, but in that year, when in unusual flood, it broke through the north levees and finally took its present course, emptying again into the Gulf of Chi-li, some 300 miles further north. Some of these shiftings of course of the Hwang-ho and of the Yangtse-kiang are indicated in dotted lines on the sketch map No. 3, where it may be seen that the Hwang-ho during 146 years poured its waters into the sea as far north as Tientsin, through the mouth of the Pei-ho, 400 miles to the northward of its mouth in 1852.

This mighty river is said to carry at low stage past the city of Tsinan, in Shantung, no less than 4,000 cubic yards of water per second and three times this volume when running at flood. This is water sufficient to inundate 33 square miles of level country 10 feet deep in 24 hours.

CANAL BUILDERS FOR CENTURIES

What must be said of the mental status of a people who for 40 centuries have

FIELDS OF GINGER JUST PLANTED; RIDGED AND FURROWED FOR DRAINAGE

Showing the amount of hand labor performed to secure the winter crop, following two of rice

measured their strength against such a Titan racing past their homes above the level of their fields, confined only between walls of their own construction? While they have not always succeeded in controlling the river, they have never failed to try again. In 1877 this river broke its banks, inundating a vast area, bringing death to a million people. Again, as late as 1898, 1,500 villages to the northeast of Tsinan and a much larger area to the southwest of the same city were devastated by it, and it is such events as these which have won for the river the names "China's Sorrow," "The Ungovernable," and "The Scourge of the Sons of Han."

The building of the Grand Canal appears to have been a comparatively recent event in Chinese history. The middle section is said to have been constructed about the sixth century B. C.;

A SEWING CIRCLE IN THE OPEN AIR AND SUNSHINE, SHANGHAI

the southern section, between Chenkiang and Hangchau, during the years 605 to 617 A. D.; but the northern section, from the channel of the Hwang-ho, deserted in 1852, to Tientsin was not built until the years 1280-1283.

While this canal has been called by the Chinese Yu-ho (Imperial River), Yunho (Transport River), or Yunliang-ho (Tribute-bearing River), and while it has connected the great rivers coming down from the far interior into a great water-transport system, this feature of construction may have been but a by-product of the great dominating purpose which led to the vast internal improvements in the form of canals, dikes, levees, and impounding reservoirs so widely scattered, so fully developed, and so effectively utilized. Rather the master purpose must have been maintenance for the increasing flood of humanity.

And I am willing to grant to the Great Yu, with his finger on the pulse of the nation, the power to project his vision for 4,000 years into the future of his race and to formulate some of the measures which might be inaugurated to grow with the years and make certain perpetual maintenance for those to follow.

THE KEYNOTE OF PERMANENT AGRICULTURE

The exhaustion of cultivated fields must always have been the most fundamental, vital, and difficult problem of all civilized people, and it appears clear that such canalization as is illustrated on maps Nos. 1 and 2 may have been pri-

LOTUS POND WITH PLANT IN BLOOM; CULTIVATED FOR THEIR FLESHY ROOTS, USED FOR FOOD

marily initial steps in the reclamation of delta and overflow lands. At any rate, whether deliberately so planned or not, the canalization of the delta and overflow plains of China has been one of the most fundamental and fruitful measures for the conservation of her natural resources that they could have taken, for we are convinced that this oldest nation in the world has thus greatly augmented the extension of its coastal plains, conserving and building out of the waste of erosion wrested from the great streams hundreds of square miles of the richest and most enduring of soils.

We have little doubt that were a full and accurate account given of human influence upon the changes in this remarkable region during the last 4,000 years, it would show that these gigantic systems of canalization have been matters of slow, gradual growth, often initiated and always profoundly influenced by the labors of the strong, patient, persevering, thoughtful, but ever-silent husbandmen in their efforts to acquire homes and to maintain the productive power of the fields.

Nothing appears more clear than that the greatest material problem which can engage the best thought of China today is that of perfecting, extending, and perpetuating the means for controlling her flood waters, for better drainage of her vast areas of low land, and for utilizing the tremendous loads of silt borne by her streams more effectively in fertilizing existing fields and in building and reclaiming new land. With her millions of people needing homes and anxious for work, who have done so much in land building, in reclamation, and in the maintenance of soil fertility, the government should give serious thought to the possibility of putting large numbers of them at work, effectively directed by the best engineering skill.

It must now be entirely practicable, with engineering skill and mechanical appliances, to put the Hwang-ho, and other rivers of China subject to overflow, completely under control. With the Hwang-ho confined to its channel, the adjacent lowlands can be better drained by canalization and freed from the accumulating saline deposits which are rendering them sterile. Warping may be resorted to during the flood season to raise the level of adjacent low-lying fields, rendering them at the same time more fertile. Where the river is running above the adjacent plains there is no difficulty in drawing off the turbid water by gravity, under controlled conditions, into diked basins, and even in compelling the river to buttress its own levees.

There is certainly great need and great opportunity for China to make still better and more efficient her already wonderful transportation canals and those devoted to drainage, irrigation, and fertilization.

ANCIENT AND MODERN CANALIZATION

In the United States, along the same lines, now that we are considering the development of inland waterways, the subject should be surveyed broadly, and much careful study may well be given to the works these old people have developed and found serviceable through so many centuries.

The Mississippi is annually bearing to the sea nearly 225,000 acre-feet of the most fertile sediment and between levees along a raised bed through 200 miles of country subject to inundation. The time is here when there should be undertaken a systematic diversion of a large part of this fertile soil over the swamp areas, building them into well-drained, cultivable, fertile fields, provided with waterways to serve for drainage, irrigation, fertilization, and transportation.

These great areas of swamp land may thus be converted into the most productive rice and sugar plantations to be found anywhere in the world, and the area made capable of maintaining many millions of people as long as the Mississippi endures, bearing its burden of fertile sediment.

There ought, and it would seem there must some time be provided a way for sending to the sandy plains of Florida, and to the sandy lands between there and the Mississippi, large volumes of the rich silt and organic matter from this and other rivers, aside from that which should be applied systematically to building

Photo by G. W. Groff

A TREADMILL PUMP, VERY COMMON IN CHINA (SEE PAGE 945)

above flood plain the lands of the delta which are subject to overflow or are too low to permit adequate drainage.

But the conservation and utilization of the wastes of the soil erosion, as applied in the delta plain of China, stupendous as this work has been, is nevertheless small when measured by the savings which accrue from the careful and extensive fitting of fields so largely practiced, which both lessens soil erosion and permits a large amount of soluble and suspended matter in the run-off to be applied to and retained upon the fields through their extensive system of irrigation.

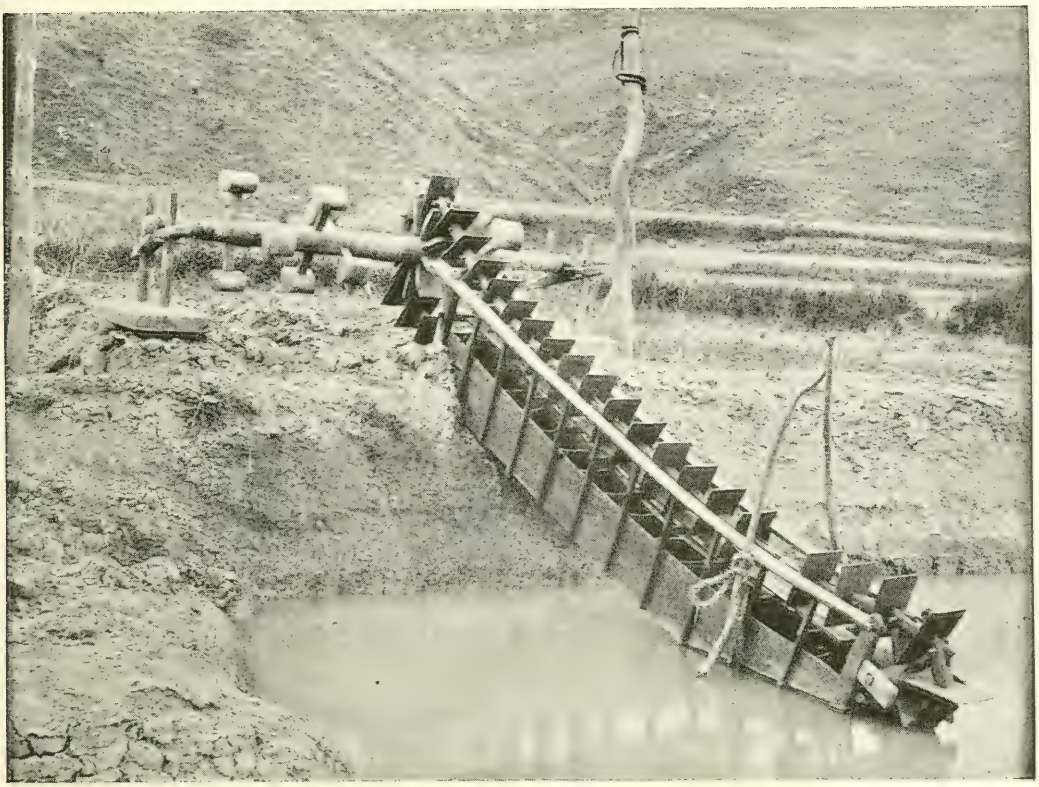
Mountainous and hilly as are the lands of Japan, 11,000 square miles of her cultivated fields in the main islands of Honshu, Kyushu, and Shikoku have been carefully graded to water-level areas, bounded by narrow raised rims, upon which 16 or more inches of run-off water, with its suspended and soluble matter, may be applied, a large part of which is retained on the fields or utilized by the crop, while surface erosion is almost completely prevented.

The total area thus surface-fitted in China must be 90,000 or 100,000 square miles. Such enormous field erosion as is tolerated at the present time in our Southern and South Atlantic States is permitted nowhere in the Far East, so far as we observed, not even where the topography is much steeper.

CONSERVATION, AN ENDURING ASSET

One of the most remarkable agricultural practices adopted by any civilized people is the centuries-long and well nigh universal conservation and utilization of all human waste in China, Korea, and Japan, turning it to marvelous account in the maintenance of soil fertility and in the production of food.

To understand this evolution, it must be recognized that mineral fertilizers so extensively employed in modern western agriculture, like the extensive use of min-



THREE-MAN CHINESE FOOT-POWER AND WOODEN CHAIN PUMP, EXTENSIVELY USED FOR IRRIGATION IN VARIOUS PARTS OF CHINA

The mechanical appliances in use on the canals and in the shops of Canton demonstrate that the Chinese possess constructive ability of a high order, notwithstanding so many of these are of the simplest forms. This picture shows a simple yet efficient pump (on page 944). A father and his two sons are driving an irrigation pump, lifting water at the rate of seven and a half acre-inches per ten hours, and at a cost, including wage and food, of 36 to 45 cents, gold. Here, too, were large stern-wheel passenger boats, capable of carrying thirty to one hundred people, propelled by the same foot-power, but laid crosswise of the stern, the men working in long single or double lines, depending on the size of the boat. On these the fare was one cent, gold, for a fifteen mile journey, a rate one-thirtieth our two-cent railway tariff. The dredging and clearing of the canals and water channels in and about Canton is likewise accomplished with the same foot-power, often by families living on the dredge boats.

eral coal, had been a physical impossibility to all people alike until within very recent years. With this fact must be associated the very long unbroken life of these nations and the vast numbers their farmers have been compelled to feed.

When we reflect upon the depleted fertility of our own older farm lands, comparatively few of which have seen a century's service, and upon the enormous quantity of mineral fertilizers which are being applied annually to them in order to secure paying yields, it becomes evident that the time is here when profound consideration should be given to the practices the Mongolian race has maintained through many centuries, which permit it to be said of China that one-sixth of an acre of good land is ample for the maintenance of one person, and which are feeding an average of three people per acre of farm land in the three southernmost of the four main islands of Japan.

Dr. Kawaguchi, of the National Department of Agriculture and Commerce, taking his data from their records, informed us that the human manure saved and applied to the fields of Japan in 1908

BOAT LOADS OF FUEL, MAINLY BUNDLES OF RICE STRAW AND COTTON STEMS, ON SOOCHOW CREEK, SHANGHAI

RICE STRAW FUEL BEING CONVEYED FROM CANAL BOATS TO CITY MARKET STALLS

DRIED GRASS FUEL GATHERED ON GRAVE LANDS, SHANGHAI

The man holds the typical rake of the Far East, made by simply bending bamboo splints claw-shape, and securing them as seen in the engraving

amounted to 23,850,295 tons, which is an average of 1.75 tons per acre of their 21,321 square miles of cultivated land in their four main islands.

In 1908 the International Concessions of the city of Shanghai sold to one Chinese contractor for $31,000, gold, the privilege of collecting 78,000 tons of human waste, under stipulated regulations, and of removing it to the country for sale to farmers. A flotilla of boats is engaged daily in Shanghai throughout the year in this service.

On the basis of the data of Wolff, Kellner, and Carpenter, or of Hall, the people of the United States and of Europe are pouring into the sea, lakes, or rivers, and into the underground waters from 5,794,300 to 12,000,000 pounds of nitrogen; 1,881,900 to 4,151,000 pounds of potassium, and 777,200 to 3,057,600 pounds of phosphorus per million of adult population annually, and this waste we esteem one of the great achievements of our civilization.

In the Far East, for more than 30 centuries, these enormous wastes have been religiously saved, and today the 400 million of adult population send back to their fields annually 150,000 tons of phosphorus; 376,000 tons of potassium, and 1,158,000 tons of nitrogen comprised in a gross weight exceeding 182 million tons, gathered from every home, from the country villages, and from the great cities like Hankau-Wuchang-Hanyang, with its 1,770,000 people swarming on a land area delimited by a radius of four miles.

Man is the most extravagant accelerator of waste the world has ever endured. His withering blight has fallen upon every living thing within his reach, himself not excepted, and his besom of destruction in the uncontrolled hands of

FERTILIZING THE FIELDS WITH CANAL MUD

In the lower section, along the path, basketfuls of canal mud had been applied in two rows at the rate of more than 100 tons per acre. The upper section shows three men distributing canal mud between the rows of a field of windsor beans.

This farmer was paying his laborers one hundred cash per day and providing their meals, which he estimated worth two hundred cash more, making twelve cents, gold, for a ten-hour day. Judging from what we saw and from the amount of mud carried per load, we estimated the men would distribute not less than eighty-four loads of eighty pounds each per day, an average distance of five hundred feet, making the cost 3.57 cents, gold, per ton for distribution.

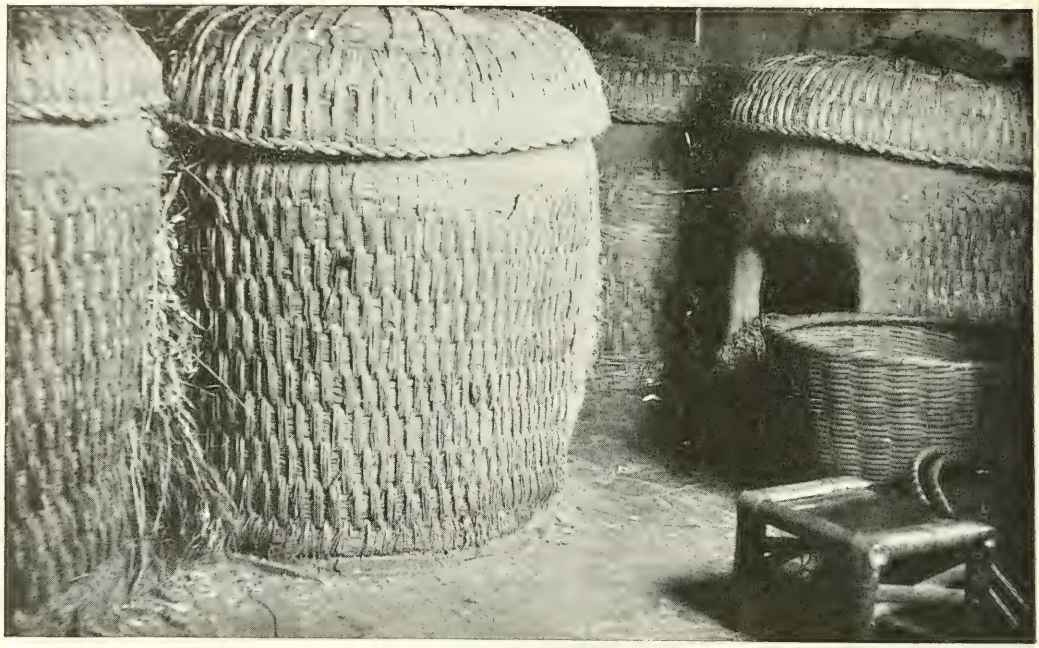
SECTION OF FIELD COVERED WITH PILES OF CANAL MUD RECENTLY APPLIED AT THE RATE OF MORE THAN 70 TONS PER ACRE

Taken out of the canal up the three flights of earth steps shown in the lower part of the figure

a generation has swept into the sea soil fertility which only centuries of life could accumulate, and yet this fertility is the substratum of all that is living.

RIVERS OF PHOSPHORUS

The rivers of North America are estimated to carry to the sea more than 500 tons of phosphorus with each cubic mile of water. To such loss modern civilization is adding that of hydraulic sewage disposal, through which the waste of 500 millions of people might be more than 194,300 tons of phosphorus annually, which could not be replaced by 1,295,000 tons of rock phosphate 75 per cent pure.



FOUR CHINESE INCUBATORS IN A ROOM WHERE THERE ARE THIRTY, EACH HAVING A CAPACITY OF 1,200 HEN EGGS

Each incubator consists of a large earthenware jar having a door cut in one side, through which live charcoal may be introduced and the fire partly smothered under a layer of ashes, this serving as the source of heat. The jar is thoroughly insulated, cased in basketwork, and provided with a cover, as seen in the illustration. Inside the outer jar rests a second of nearly the same size, as one teacup may in another. Into this is lowered the large basket with its 600 hen eggs, 400 duck eggs, or 175 goose eggs, as the case may be. After a basket of hen eggs has been incubated four days it is removed and the eggs examined by lighting, to remove *those which are infertile before they have been rendered unsalable. The infertile eggs go to the store and the basket is returned to the incubator.* Duck eggs are similarly examined after two days' and again after five days' incubation, and goose eggs after six days and again after fourteen days. Through these precautions practically all loss from infertile eggs is avoided and from 95 to 98 per cent of the fertile eggs are hatched, the infertile eggs ranging from 5 to 25 per cent.

The Mongolian races, with a population now approaching the figure named, occupying an area little more than one-half that of the United States, tilling less than 800,000 square miles of land, and much of this during 20, 30, or perhaps 40 centuries, unable to avail themselves of mineral fertilizers, could not survive and tolerate such waste.

Not even in great cities like Canton, built in the meshes of tide-swept rivers and canals; like Hankau, on the banks of one of the largest rivers in the world; nor yet in modern Shanghai, Yokohama, or Tokyo, is such waste permitted. To them such a practice has meant race suicide, and they have resisted the temptation so long that it has ceased to exist.

Had the Mongolian races spread to and developed in North America instead of or as well as in eastern Asia, there might have been a Grand Canal, something as suggested on page 933, from the Rio Grande to the mouth of the Ohio River and from the Mississippi to Chesapeake Bay, constituting more than 2,000 miles of inland waterway, serving commerce, holding up and redistributing both the run-off water and the wasting fertility of soil erosion, spreading them over 200,000 square miles of thoroughly canalized coastal plains, so many of which are now impoverished lands, made so by the intolerable waste of a vaunted civilization.

And who shall venture to enumerate

The recently removed canal mud, in the upper section of the illustration, is heavily charged with large snail shells. The lower section shows the shells in the soil of a recently spaded field.

The shells are by no means as numerous generally as here seen, but yet sufficient to maintain the supply of lime. Several species of these snails are collected in quantities and used as food. Piles containing bushels of the empty shells were seen along the canals outside the villages. The snails are cooked in the shell and often sold by measure to be eaten from the hand, as we buy roasted peanuts or popcorn. When a purchase is made, the vender clips the spiral point from each shell with a pair of small shears. This admits air and permits the snail to be readily removed by suction when the lips are applied to the shell.

TYPE OF CONVEYANCE EXTENSIVELY USED IN JAPAN FOR THE REMOVAL OF CITY AND VILLAGE WASTE

Such carts are even more frequently drawn by men than by cattle or horses, and [illegible]

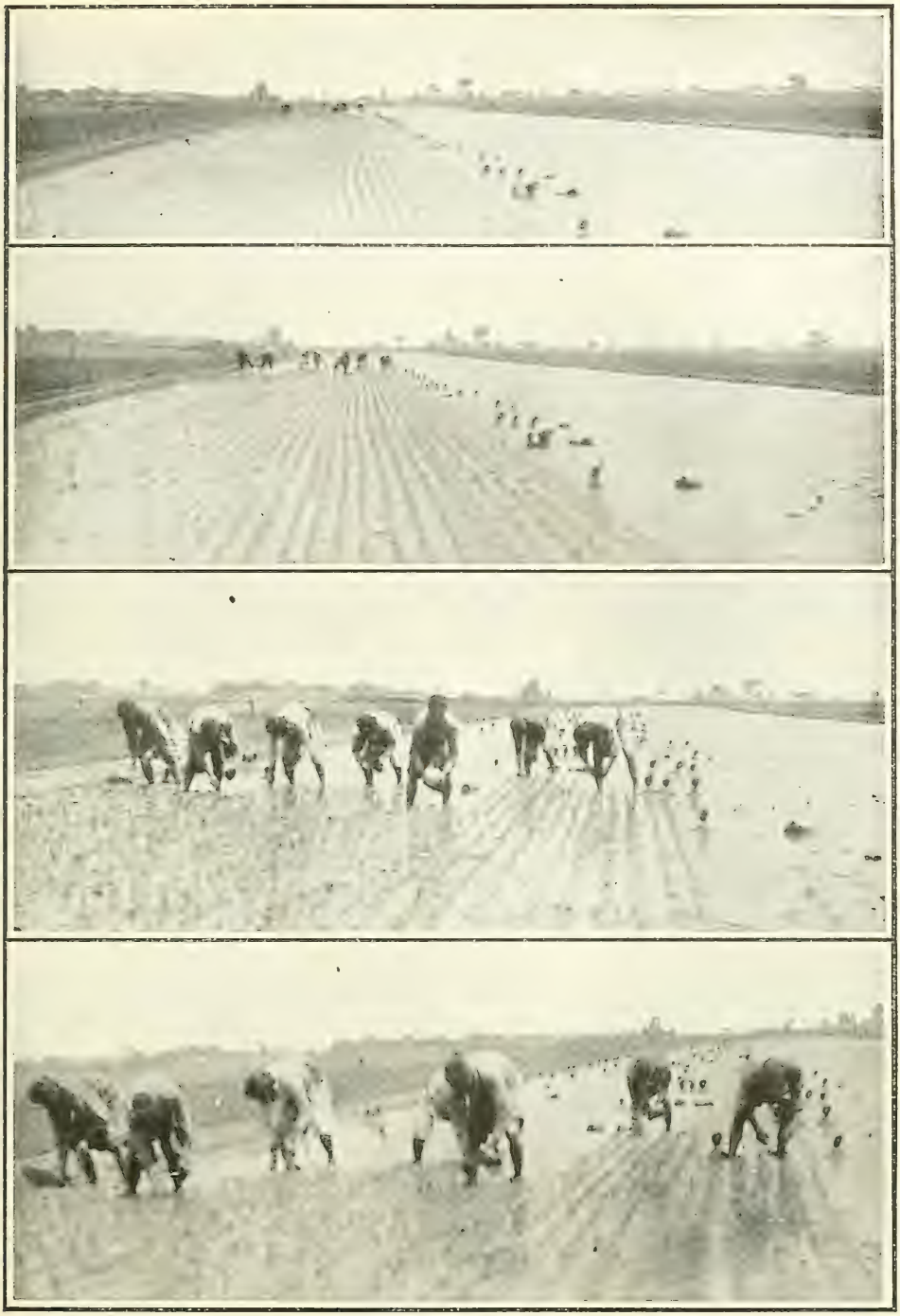
THE YOUNG MAN IS LOADING HIS BOAT WITH CANAL MUD, USING THE LONG-HANDLED CLAM SHELL DREDGE, WHICH HE CAN OPEN AND CLOSE AT WILL

IRRIGATION BY MEANS OF THE SWINGING BASKET, PROVINCE OF CHI-LI, CHINA

NURSERY BED OF RICE 29 DAYS PLANTED

Showing irrigation furrows; field beyond flooded, partly plowed. The rice in the nursery bed is nearly ready for transplanting

GROUP OF CHINESE WOMEN PULLING RICE IN A NURSERY BED, TYING THE PLANTS IN BUNDLES PREPARATORY TO TRANSPLANTING



TRANSPLANTING RICE IN CHINA

Four views taken from the same point at intervals of 15 minutes, showing the progress made during 45 minutes.

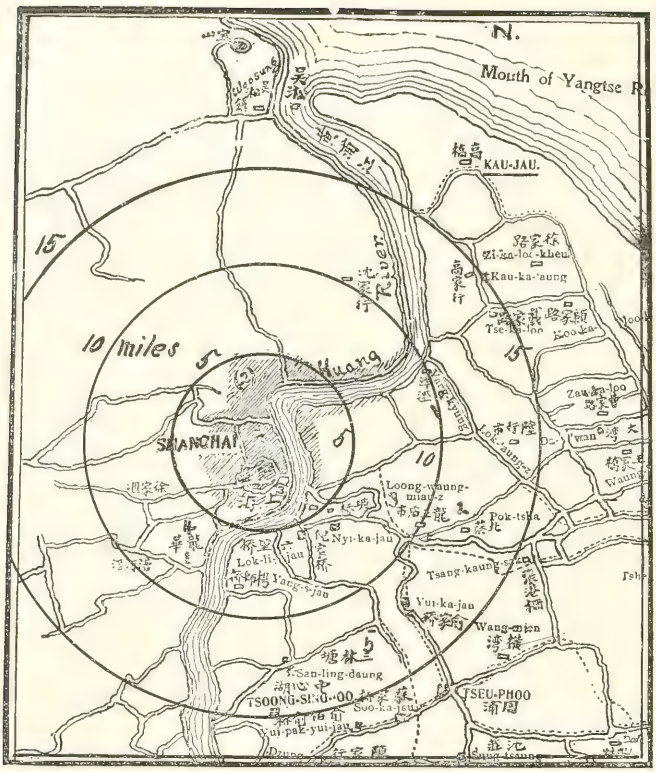
The seven men in this group would thus set two and a third acres per day and, at the wage Mrs. Wu was paying, the cash outlay, if the help was hired, would be nearly 21 cents per acre. This is more cheaply than we are able to set cabbage and tobacco plants with our best machine methods. In Japan the women participate in the work of setting the plants more than in China.

After the rice has been transplanted its care, unlike that of our wheat crop, does not cease. It must be hoed, fertilized, and watered. To facilitate the watering all fields have been leveled, canals, ditches, and drains provided, and, to aid in fertilizing and hoeing, the setting has been in rows and in hills in the row.

JAPANESE YOUNG WOMEN TRANSPLANTING RICE, UNDER BROAD SUNSHADE HATS

WILD WHITE ROSE IN BLOOM WEST OF SUCHOW, JUNE 2

The rosebush has overspread a clump of trees, one of which is 30 feet in height, enveloping it in a mantle of bloom. The lower illustration is a closer view, showing the clusters. The stem of this rose, 3 feet above the ground, measured 14.5 inches in circumference. If it would thrive in this country, nothing could be better for parks and pleasure drives.



MAP OF COUNTRY SURROUNDING SHANGHAI, CHINA

Showing a few of the many canals on which the waste of the city is conveyed by boat to the farms

the increase in the tonnage of sugar, bales of cotton, sacks of rice, boxes of oranges, baskets of peaches, and in the trainloads of cabbage, tomatoes, and celery such husbanding would make possible through all time; or number the increased millions these could feed and clothe?

TEMPORIZING WITH THE FUTURE

We may prohibit the exportation of our phosphorus, grind our limestone, and apply them to our fields, but this alone is only temporizing with the future. The more we produce, the more numerous our millions; the faster must present practices speed the waste to the sea, from whence neither money nor prayer can call them back.

If the United States is to endure; if we shall project our history even through 4,000 or 5,000 years, as the Mongolian nations have done, and if that history shall be written in continuous peace, free from periods of widespread famine or pestilence, this nation must orient itself; it must square its practices with a conservation of resources which can make endurance possible.

Sooner or later we must adopt a national policy which shall more completely conserve our water resources, utilizing them not only for power and transportation, but primarily for the maintenance of soil fertility and greater crop production through supplemental irrigation, and all these great national interests should be considered collectively, broadly, and with a view to the fullest and best possible coördination.

China, Korea, and Japan long ago struck the keynote of permanent agriculture, but the time has now come when they can and will make great improvements, and it remains for us and other nations to profit by their experience, to adopt and adapt what is good in their practice, and help in a world movement for the introduction of new and improved methods.

THE MOST EXTRAORDINARY CITY IN THE WORLD

Notes on Lhasa—The Mecca of the Buddhist Faith

By Shaoching H. Chuan, M. D.

Medical Officer of the Chinese Mission to Tibet

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DURING the last century some ten foreign travelers have entered Tibet either as scientific explorers or as political representatives. The precipitous, lofty mountains, and the distant stretches of wild, uninhabited desert have made the journey too great a task for not a few of them to perform. Owing to these difficulties, together with the lack of traveling facilities and the stubborn resistance of the Tibetans, most of them had to be satisfied with nothing more than excursions into the regions near the boundary line. Few ever succeeded in seeing the interior of the sacred city, Lhasa, the capital of Tibet.

In the year 1904 the British military expedition to Tibet succeeded in entering Lhasa. As a result of this expedition much of the mystery and secrecy of the Forbidden City was revealed, and Lhasa no longer remained an unexplored religious center of the world. But the English did not have their curiosity satisfied. The shortness of their stay, the natives' suspicion of the white people, and the objection to foreigners entering the various sacred places proved the main obstacles to the realization of their wishes.

When I visited Lhasa, with the Chinese Mission to Tibet, in 1906-1907, I enjoyed several advantages. In the first place, having a Chinese official position, I did not awaken any suspicion in the minds of the natives. Furthermore, I was equipped with all modern facilities for taking records and photographs, and was given the privilege of visiting places hitherto and since denied to all foreigners. My comparatively longer sojourn in Lhasa also gave me ample opportunity for obtaining information and pictures that are rare and unique.

This article is written for the purpose of giving the readers of this magazine a brief account of the general characteristics of Lhasa only. Details of the customs, manners, government, and religious beliefs of the people cannot be given in the limited scope of this article; but I hope that readers may be able to learn much from the photographs, most of which are the only ones in existence.

Lhasa is situated in an impressive and picturesque valley, 16 miles long by 2 to 4 miles wide, and 12,500 to 13,500 feet above the sea-level. It is surrounded by mountains ranging from 3,000 to 6,000 feet above the valley. The weather is not excessively hot in summer nor bitterly cold in winter, for the high plateau is above the reach of the heat waves, and the still higher mountains seem to shut off the freezing winds. The natives call Lhasa "The Ideal City of the World," and certainly not without reason, at least as far as weather is concerned.

Only two entrances, one at the eastern end and the other at the western end, open into this isolated valley. Two highways go out from the entrances—the one on the east leading into China, and that on the west into Upper Tibet and British India. A large stream, called the Kichu, flows in from the eastern entrance, winds through the southern part of the valley, and emerges at the west, finally joining the Brahmaputra, which is one of the important rivers of the world.

As the traveler comes into the western entrance an imposing view of Lhasa Valley meets his eyes. The glittering golden

DUPON MONASTERY, WHERE 7,500 LAMAS LIVE, AND THE GREAT ORACLE OF STATE (SEE TEXT, PAGES 967 AND 973)

FROM LEFT TO RIGHT: POTALA HILL, MEDICAL HILL, AND MILLSTONE HILL

roofs of the palace of the Dalai Lama on the hill Potala, contrasted with the rugged tops of the Medical Hill, apparently floating in the air, form a grand and brilliant sight, that can hardly fail to gladden the heart of the weary explorer. Further on, after passing by the extensive Dupon Monastery and the Great Oracle (see page 960), he arrives at the back of Potala Hill (see page 963), and is brought face to face with the Medical and the Millstone Hills (see pages 965 and 985).

Contrary to Oriental custom, the city of Lhasa has no wall. A broad highway is built around the city instead. Lhasa is 2 miles long and a little less than 1 mile wide. Its north and east sides are open, while the Ki River protects the southern part, with Potala and Medical Hills guarding the west side.

The city gate (see page 964), decorated with pagodas, opens between these two hills. The pagodas are built of white stone, with golden domes. These emblems of Lamaism are made even more magnificent by the reflection seen in the water. Indeed, any pilgrim can but feel satisfied, not to say sanctified, by gazing upon such a splendid and beautiful vision before entering the "Happiest Western World."

Nothing impresses the traveler more, as he first enters the city, than the palace of Dalai Lama (see pages 962 and 963). The ancient Vatican of Lhasa stands on the left, venerable and majestic, ever ready to welcome those who come to worship within its walls.

The western part of the city is practically uninhabited. One has to travel another mile before he finds himself in the city proper, the part of Lhasa which has long attracted the attention of adventurers.

The main streets of Lhasa are generally wide and fairly smooth. There is no heavy traffic in Tibet. Carts and carriages are beyond the natives' imagination. Every one travels on foot. The yak and the horse are the only two means of conveyance. One can easily see why the streets are generally so even. Only the Dalai Lama and the two Ambans ride in sedan-chairs. Other people are not allowed to enjoy this privilege.

The houses are usually built of stone and are two or three stories high. The outside looks clean, with its whitewash, but the inside is dark and dirty to the last degree. Rich and poor are all alike in this respect.

To my surprise and disgust, I found that the first floor of every house is always occupied by a yak stable. Hence every visitor is first welcomed by the yak stable, with its disagreeable odor constantly pouring out.

Like the Jewish style of building, all the houses have flat roofs, which are accessible by small doors. A peculiarity of Tibetan houses is that they have no chimneys. The windows serve the double purpose of letting the light come in and the smoke out. The walls are thus made very dark with soot.

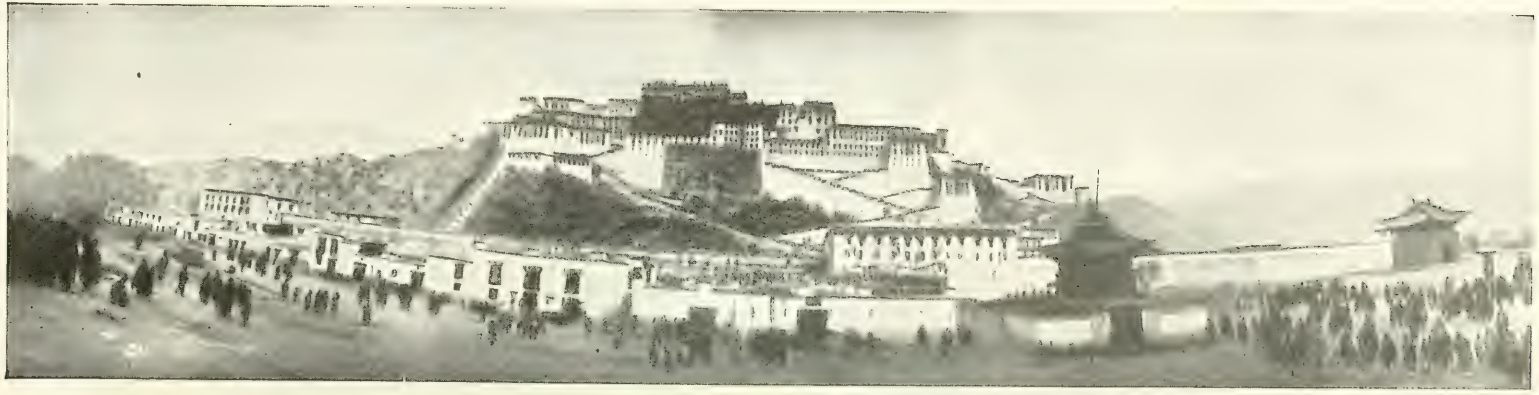
THE PALACE OF THE DALAI LAMA

Most prominent and important of all the buildings in the city of Lhasa is undoubtedly the palace of Dalai Lama. It is a fortified palace located on the Potala Hill, at the western end of the city. It is about 4,000 feet high and 1,000 feet long, containing 490 rooms and 1,333 windows. The entire structure is built of stone, whitewashed on the outside, except the upper half of the middle portion, which is painted crimson. All the eaves of the roof and the copings of the zigzag-shaped steps are also crimson.

The Living Buddha occupies the central section of the upper part, while the rest is divided into lecture and prayer halls, executive department, treasury, granary, and bed-rooms for 350 Lamas. A sacred part of the palace is reserved for the topes, or tombs, of former Living Buddhas.

Below, in front, is a large paved arena which serves as the dancing ground. Outside of the arena are many buildings for printing prayers, casting bronze images, manufacturing incense, keeping cattle, slaughter-houses, stores, etc. Stone walls, with barracks and garrison on the top, protect the front, left, and right sides.

TIBETAN SOLDIERS ENCAMPED IN FRONT OF THE PALACE



"THE NEW POTALA"

This photograph differs from others in that it has two extra great images of Buddha on the front of the wall of the palace. It is the only photograph of its kind that has ever been taken

THE PALACE OF THE DALAI LAMA ON THE POTALA HILL

BIRD'S-EYE VIEW OF THE PALACE OF THE DALAI LAMA, WITH ITS FOREGROUND
A portion of the city proper is seen on the extreme right (see text, pages 961, 965)

"PAGO-LING," THE MAIN ENTRANCE OF LHASA CITY

A TIBETAN MAKING PROSTRATION BEFORE THE PALACE IN WORSHIP

BIRD'S-EYE VIEW OF THE TEMPLE OF THE GOD OF WAR, BEHIND THE MILLSTONE HILL

Two yellow pavilions stand outside of the wall, in front of which is a granite pillar about 20 feet high. It is said that this pillar was built in order to protect the palace against attacks by evil spirits.

According to tradition, the work of this gigantic construction began about 1,200 years ago. The forts and garrisons were first built. Other parts of the palace were later additions. It took nearly ten centuries to complete this Lama Vatican; and it was not until 200 years ago that its present majestic appearance was finally attained.

Dwelling in such a heavenly abode, the Living Buddha cannot but look down upon the world with pride and dignity.

This magnificent mansion, with its colors of white, crimson, red, and brown, and its golden roofs, against the background of green grass and blue sky, forms a picture of splendor and beauty that can hardly be surpassed. It is not strange that pilgrims from all parts of the Buddhist world come to worship at this Mount of Holiness.

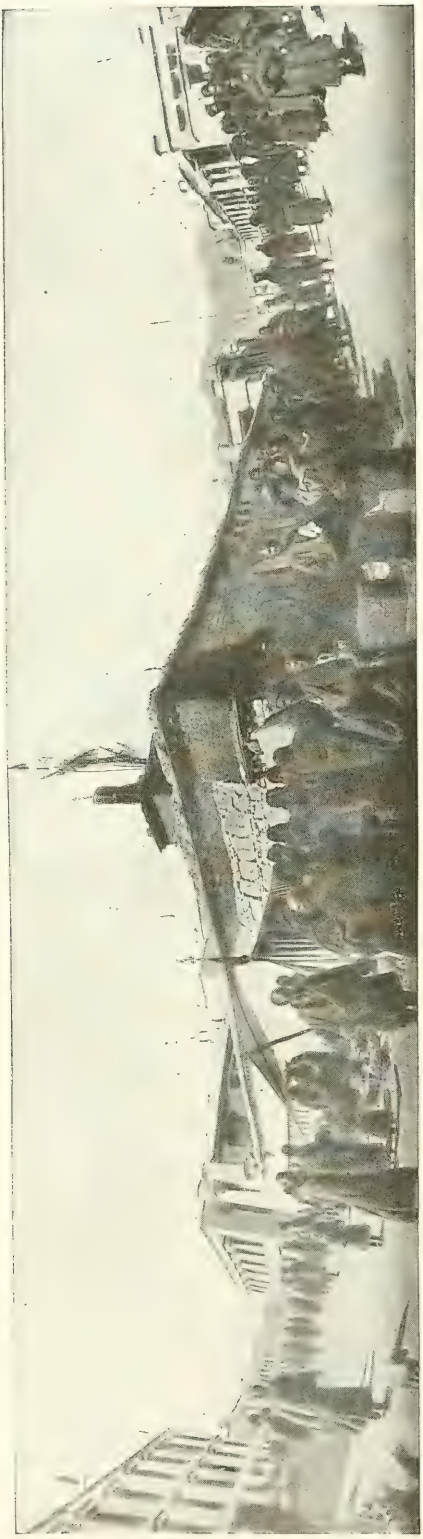
The Palace of Dalai Lama indeed bears out the statement that at Lhasa are to be found some of the noblest specimens of architecture in central Asia.

Noble and beautiful as the exterior of the palace is, the interior is quite the opposite. Like most Lama temples, the interior of the palace is dark and filthy. The rooms occupied by Dalai are the only clean portion of this much-revered religious edifice.

THE GREAT TEMPLE OF LHASA—CHO-KANG

The Great Temple of Lhasa stands conspicuous in the center of the city. Though its external appearance is not very attractive, the interior is fascinating in the highest degree (see page 969). Towers, pavilions, and golden roofs form the most beautiful exterior decorations.

Unlike most monasteries in Tibet, which are generally several stories high



THE BUSINESS SECTION OF LHASA CITY: NOTE THE FLAT ROOFS AND THE PRAYER-FLAGS

and built of massive stone blocks, this consists of large single-storied buildings in rows, one behind another, like the temples usually seen in China.

The great Cho-kang was built by the Chinese princess Wen-ch'eng, of the Tang dynasty, who was married to the Tibetan King Strong-tzan. It was she who first introduced into Tibet Chinese etiquette and manners and Hindoo literature, and taught the natives weaving and agriculture. Tibetans respected and loved her so devotedly that they had her canonized after her death. Her image was erected in this temple in memory of her great kindness and wonderful achievements.

Every year, on her birthday, the fifteenth of the tenth month (Tbetan), Tibetans come to this temple to perform various religious ceremonies signifying their undying gratefulness. On the same day a lantern festival also is observed. The whole city is illuminated with butter lamps made in the shape of a Chinese lady's shoe, the emblem of the mother of Tibetan civilization.

The most notable feature of this temple is an image of Buddha. It is 30 feet high. The entire body is gold-plated and inlaid with pearls, coral, turquoise, and other kinds of precious stones (see page 971). The design of this extraordinary work is so curious and elaborate that the like of it can scarcely be imagined. So difficult was the transportation of this idol that the natives claim it was moved to Tibet from China by the gods in a night.

A five-colored statue is set in the wall of one of the rooms. It is said to have been heaven born, not made by man.

Numerous rats of monstrous size are seen running through the halls or peeping from behind the images. Superstition leads the people to worship them as divine.

Various kinds of ancient arms are also found in the temple. The most interesting of all are two bronze drums of the Han dynasty and one big cannon of the T'ang dynasty, with five characters cast on it. These characters mean literally "Majesty of the Imperial Power extinguished the rebellion."

The so-called "Sanctuary" is in the very innermost part of the temple. The

TIBETAN HOUSES, SHOWING THE FLAT ROOFS

rules that govern this Lama "Holy of Holies" are strikingly like those established by God for the Israelites. A screen made of iron rings (see page 970) veils the sacred image from the common people.

Around the temple are markets and stores. The noise of all kinds of traffic continues through the day. Multitudes of people throng the temple from morning till night. Lamas go in and out to perform their daily duties, pilgrims make prostrations on the floor in worship, and hosts of beggars infest the holy place craving food and money. Such is the superstition of the ignorant, mingled with the suffering of the poor, in striking contrast with the riches of the institutions of the Lama religion.

A great sacred conference is held annually in this temple from the second of the second month until the 22d, when 80,000 Lamas from all over the Lama Kingdom assemble daily for prayer, reading of their classics, and other religious observances.

On the outside are many tablets erected for the purpose of commemorating the military achievements of the Chinese generals who subdued the Tibetans. Among them two tablets are of great historic significance to the Chinese. The one on the right was erected in memory of the alliance between the second emperor of the T'ang dynasty and his nephew, the son of Princess Wen-cheng. The other one, in front, relates the history of founding hospitals and efforts made to stamp out an epidemic of smallpox, which had been harassing the whole country.

THE THREE GREAT MONASTERIES OF LHASA

Seven miles to the west of Lhasa is the largest monastery in Tibet, called the Dupon Monastery. It is situated in a rocky ravine between high mountains (see page 960). Its size is so enormous that, looking from a distance, one may easily mistake it for a large city. Amid the numerous buildings is a beautiful

"NOR-BU-LINGA," THE DALAI LAMA'S GARDEN, WEST OF MEDICAL HILL, OUTSIDE THE CITY

An artificial lake of fresh running water occupies the center. On the northern side of the lake is a golden-roofed pavilion. The goldfish swimming in the lake, the snowy ducks floating on the water, the white stone railings, and the blooming trees make an ideal place for the "Living Buddha's" hours of rest and leisure. Since the common people are forbidden to enter, few people realize that there exists in Tibet such an enchanting fairyland.

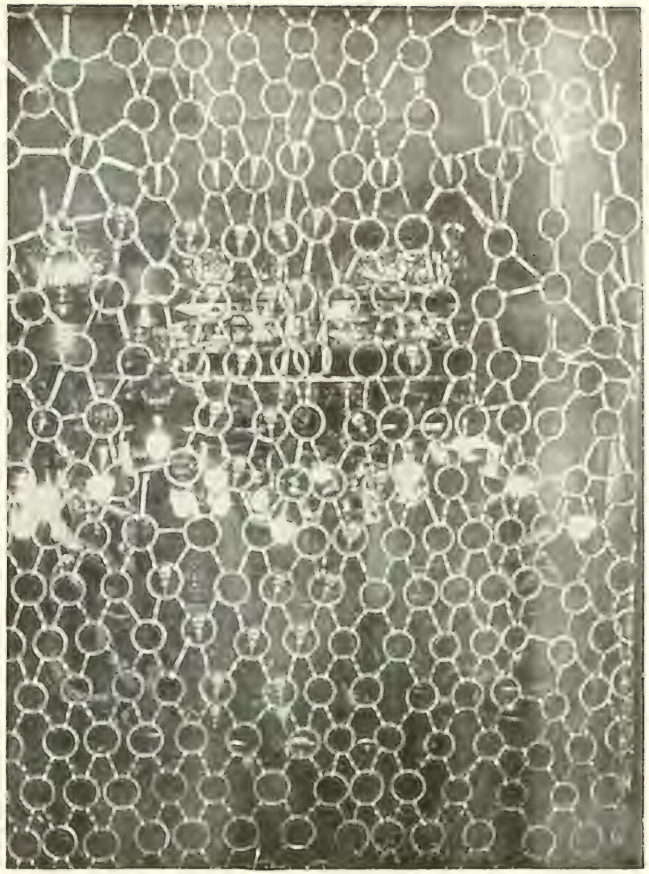
LAKELET BEHIND POTALA HILL

The water is exceedingly clear, surrounded with green trees. There is a small island in the lake, and in summer people come to enjoy pleasure

THE GOLDEN ROOFS OF THE GREAT TEMPLE OF LHASA (SEE TEXT, PAGES 965 AND 966)

THE ENTRANCE OF THE GREAT TEMPLE OF LHASA, WHERE AT THE ANNUAL SACRED CONFERENCE 80,000 LAMAS ASSEMBLE FOR DAILY PRAYER

THE ABBOT OF THE GREAT TEMPLE OF LHASA, WHERE 80,000 LAMAS COME FOR DAILY PRAYER ON THE OCCASION OF THE YEARLY CONFERENCE, WHICH LASTS FOR THREE WEEKS.



"A SCREEN MADE OF IRON RINGS VEILS THE SACRED IMAGE FROM THE COMMON PEOPLE" (SEE TEXT, PAGE 967)

THE FAMOUS IMAGE OF BUDDHA IN THE GREAT TEMPLE OF LHASA (SEE TEXT, P. 966)

garden, which serves as a summer resort for the Dalai Lama, who goes there to discourse upon the Lama classics every summer.

Seventy-five hundred Lamas live in this monastery, which has room enough to accommodate any of the largest universities in the United States.

There is a Buddha here who is reported to have come out from the water four centuries ago to deliver the people from floods that used to ravage the country.

No stronger evidence of the superstitious mind of the natives can be given than the idea which they have regarding the clay body of the seventh Dalai Lama, which is in this monastery. Tibetans sincerely believe that it is the living body of the seventh Dalai Lama. It is said that the bosom of the body is still warm, though the seventh Dalai Lama died several decades ago. The truth as to this tradition cannot be ascertained, since no one is allowed to touch the body.

There are many large images. Of these the largest in size is called "Mîê," and is gold-plated and adorned with pearls, gems, and numberless precious stones. Here are also two fasces (see

THE SERA MONASTERY, WHICH ACCOMMODATES 5,500 LAMAS, AND IS THE SECOND LARGEST MONASTERY IN LHASA

LAMAS HOLDING THE TWO FASCES AWARDED BY THE CHINESE EMPEROR K'ANG-HSI TO RESTRAIN AND PUNISH THE DISOBEDIENT LAMAS (SEE TEXT, PAGE 973)

The Lama on the left holds a yellow cap

THE IMAGE OF TZUNG-KA-BA

"Unlike other Buddhist images, which usually have a stiff and wooden expression, Tzung-ka-ba is represented by an image having a face like that of a human being" (see text below).

page 972), awarded by the former emperor, K'ang-hsi, to restrain and punish the disobedient Lamas.

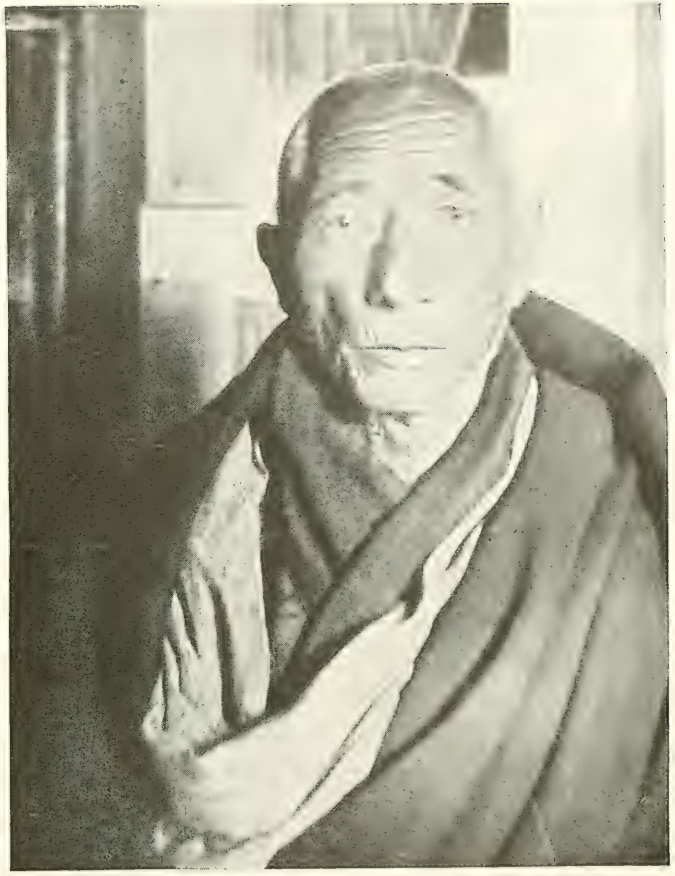
In front of Dupon is the Great Oracle of State (see page 960), where inspired Lamas give answers to inquiries made by those who are eager to know their fortunes or outcome of various affairs. It has even greater influence and authority than the oracle at Delphi, since here questions are asked and answers given in regard to governmental policy as well as private matters. Its ruling divinity has very wretched features. He is supposed to have sprung from a tree. The shingles of the roofs are made of arrows collected after different battles.

THE SERA MONASTERY

The Sera, or the "Golden Hill, Monastery (see page 972) is situated along the hillside north of the city. It is next to the Dupon Monastery in size, with room for 5,500 Lamas.

The worship of Tzung-ka-ba, the founder of the Yellow-cap sect of Lamaism, has its seat in this monastery. Unlike other Buddhist images, which usually have a stiff and wooden expression, Tzung-ka-ba is represented by an image having a face like that of a human being (see above) and holding a scepter which is said to have come down from heaven.

BACK VIEW OF A LAMA, SHOWING THE YELLOW CAP AND THE ORNAMENT ON THE BACK



TI-RIMBOCHE, REGENT OF TIBET

The most learned man in Tibet is chosen Regent (see text, page 979)

THE DUKE OF LHASA, BROTHER OF THE DALAI LAMA

He wears a black fur hat and yellow satin topped fur robe, and has a long ear-ring of turquoise in his left ear

THE DUKE OF LHASA ENJOYING HIS TEA

Notice the tea-pot on his right, tea-cup in front, and spittoon on the left. Tibetans are the most inveterate tea-drinkers in the world. The peculiarity of their tea is that it is a mixture of tea, butter, salt, and sometimes barley flour, boiled together.

WIFE OF DAIBEN (THE GENERAL)

Her adornment is about the same as that of the Prime Minister's wife. In addition, however, she wears the large headgear of priceless pearls, shown in the picture.

THE PRIME MINISTER'S WIFE IN HER COURT GARMENT

A ring decorated with large corals may be seen around her head. Her hair is parted in the middle and hangs loose on her shoulders. On her forehead is a bandeau of pearls. She wears two large ear-rings inlaid with corals, pearls, and precious stones. A pendant and a charm-box are on her breast, all made of gold and inlaid with pearls and precious stones. Long necklaces of the same materials hang down to her feet. It is said that the ornaments she has on her person cost about twenty-five thousand "Tang-ka" ($2,000). A Tang-ka is a Tibetan silver coin amount-

CHIEF KALUN AND DAIBEN IN COURT ROBES MADE OF BEAUTIFULLY COLORED EMBROIDERY

Mongolian nobles often make long journeys to this place for worship, and not a few of them have become Lamas during their visits. The son of the Mongolian Prince Kung has already been transformed into a "Living Buddha." From his forehead grows the much-coveted "Wonder Pearl," a pearl of the size of a millet grain, which constitutes the most vital part of Buddhism. People travel from remote parts of the Buddhist world to Lhasa in order to get this pearl, which they believe to be omnipotent.

THE GANDAN MONASTERY

The third monastery in size and importance is the Gandan Monastery, to the east of the city. Tzung-ka-ba is said to have become a "Living Buddha" in this monastery. About 2,000 Lamas live and study here.

The power and influence of these three great monasteries can hardly be overestimated. With a total number of 15,000 Lamas, they are strong enough to control almost anything. The leading Lamas are often found engaging in poli-

A BRIDE

She is the daughter-in-law of Chief Kalun. The band around her breast is the sign of a bride.

TIBETAN SOLDIERS IN ARMS

Matchlocks, bows, and arrows are their weapons. Note shirts of chain worn by the two men on the right

A TROOP OF TIBETAN SOLDIERS

tics or meddling in governmental affairs. Sometimes they become so strong that even the Dalai Lama and the Ambans seem to be unable to control them.

Lamaism is the state religion of Tibet and its power in the Hermit Country is tremendous. Religion dominates every phase of life. The propagation and development of Lamaism are accomplished by very effective methods. For instance, in a family of four sons, at least two, generally three, of them must be Lamas. Property and family prestige also naturally go with the Lamas to the monastery in which they are inmates. In this way not only is the monastery growing richer every year, but its authority, too, is constantly increasing.

Keeping the common people, or laymen, in ignorance is another means of maintaining the power of the Lamas. Nearly all the laymen are illiterate Lamas are the only people who are taught to read and write. That ignorance breeds superstition is a well-known axiom. Tibetans at the present day, owing to their ignorance, are fast cob-webbed by numberless superstitions which have been accumulated for centuries. There is scarcely a single action or object that they do not believe to be controlled either by gods or by evil spirits.

THE GOVERNMENT OF TIBET

Tibet is governed by the Dalai Lama as politico-religious head and two "Ambans" as the political dictators. The Ambans are appointed by the Chinese Emperor every four years. All governmental affairs have to undergo examinations by the two Ambans, and all governmental policy must be sanctioned by them before it can be put into operation. Literally, the Dalai Lama is under the authority of the two Ambans, but being supposed to be the incarnation of the principal Pope-god Lobzong, he sometimes can issue commands which are beyond the control of the two Ambans.

Below the Dalai Lama is the Regent (see page 974), who must be the most learned Lama in the whole country. Next in rank are the four Ministers of State. One of these must be a Lama, while the other three are laymen. The position of Prime Minister is held by the one of the four who has been a minister for the longest term.

Other officers are two Judges ("Miben"), who are in Lhasa; a treasurer ("Changtzo"); there is also a "Daiben" (General) and "Ruben," "Giaben," "Dingben," and "Chuben" (officers ruling 250, 125, 25, and 10 men respectively).

A COMMON TIBETAN IN CLOTHES MADE OF YAK-HIDE

A TIBETAN SOLDIER IN CHAIN ARMOR, AND HELMET WITH PEACOCK FEATHER. HE ALSO WEARS AN EARRING.

THE SHERIFF, WEARING A YELLOW HAT AND EAR-RINGS, WITH A WHIP HANGING AT HIS BACK

FRONT AND BACK VIEWS OF OFFICIAL ATTENDANTS

The flat hats are made of red wool. They also wear queues and ear-rings

FRONT AND BACK VIEWS OF POOR TIBETAN GIRLS

Notice their head bands and braids of hair

A TIBETAN WOMAN WEARING A SHELL BRACELET ON HER RIGHT WRIST

Since there is no sea in Tibet, all things from the sea are expensive curios. The enchanting "sound of the sea," caused by placing a shell close to the ear, makes the Tibetans believe that the shell has power to protect them. The woman is holding a crochet needle, and wool yarn is in her left hand.

A TIBETAN SALUTING

Tibetans salute their superior by showing their tongues and putting out the thumb of one or the thumbs of both hands. They also take off their hat and make a deep bow.

ORDINARY TIBETAN GIRL

She wears a head band with coral and turquoise of moderate cost

FOUR MASONS

In Tibet the work of carpenters and masons is done by women. Women transact also a large part of the business and perform much toil and drudgery of various kinds. Two-thirds of the Tibetan men are Lamas. As a rule the men are immoral and very lazy.

THE ABBOT OF THE TEMPLE OF THE GOD OF MEDICINE, WITH THREE MEDICAL PUPILS

MEDICAL HILL

THE YAK, THE CHARACTERISTIC ANIMAL OF TIBET

As I have already said, the principal animals of Tibet are the yak and the horse. Of the two, the yak is by far the more useful and also much more common. The yak in many respects resembles the American buffalo, except that it is smaller.

Tibet is the only country that produces this peculiar animal, for it must live in a region at least 9,000 feet above the sea-level, and the average height of Tibet is from 12,000 to 15,000 feet above the sea.

To the Tibetans the yak is absolutely indispensable. Nearly every part of the animal is utilized. They eat its meat, drink its milk, use its butter, and wear its skin. Ropes and cloth are made of yak's hair, and dusters are fashioned from its tail. Strange to say, many houses in the northeast and southwest parts of Lhasa are built with yak horns (see page 988). Boats are also constructed with yak hide (see page 989). Owing to the lack of coal and the fact that wood is so scarce, the Tibetans use dry yak dung for fuel. The walls of some houses are also built of this material.

PRAYER WHEELS

As to all Christians, prayer is to the Tibetans also the most vital factor of their religious life. Fearing that the tongue and the mind may fail to offer sufficient prayer, additional praying is done by means of a prayer wheel.

A prayer wheel consists of a hollowed box, or cylinder, within which is a roll of prayers, with an axis running through the center, revolved by the centrifugal force. Attached to the outside is a short string or chain with a small weight at the end. The wheel is made to revolve by the centrifugal force of the weight, caused by a twirling motion of the hand. Thus the roll of prayer is turned within while the wheel revolves, and the prayer is done. Meanwhile the holder of the wheel also makes oral and silent prayers.

Tibetans believe that emancipation from sin can be obtained by walking over the road which surrounds the city several times a day and praying in the above manner.

Another way of offering prayer is by arranging prayer wheels in such a way that they will be turned by the wind (see page 993). There is still a third way, in which the prayer wheel is turned by the water of a stream. Prayer pennants are seen everywhere throughout the country. Some say that these ridiculous ways of praying originated from the extraordinary laziness of the Tibetans.

MEDICAL HILL, SHOWING THE "TEN THOUSAND" COLORED IMAGES CARVED IN THE SLOPE OF THE HILL

TIBETAN WRITING

Tibetans have two ways of writing characters. One is with pen and ink, the other with a style, chalk powder, and blackboard. In the pictures is shown a Tibetan holding a stub-shaped bamboo pen in his right hand (see page 991). The inkstand is set in the box further to the right. He writes horizontally from left to right, like Europeans.

The other picture (page 991) depicts the second method. The writer holds in his left hand a blackboard covered with chalk powder. In his right hand is a small style, with which he scratches the characters on the blackboard. These characters are formed by the exposed black background. This process of writing is most interesting and unique, being just the opposite of the ordinary chalk-and-blackboard system.

BURIAL CUSTOMS OF TIBET

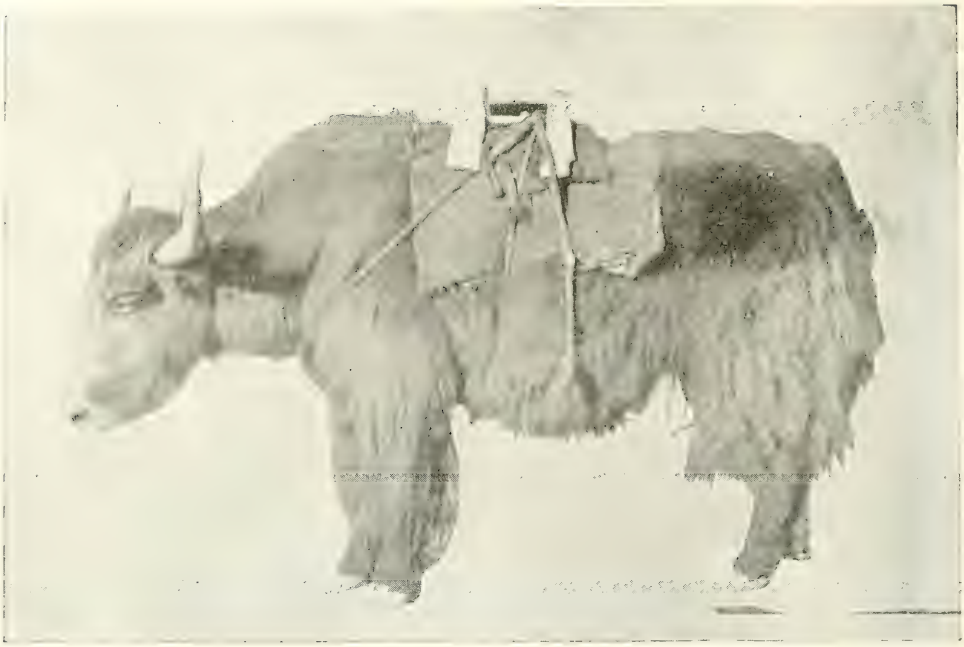
Most astounding and superstitious perhaps of all the customs in Tibet are the different ways of burial which prevail. Lamas of the higher order are generally cremated by fire. Some of the dead bodies of the ordinary people are placed on the top of high mountains, where they become the prey of crows, hawks, and vultures.

The common people generally dispose of the bodies of deceased persons by cutting the flesh into small pieces and pounding the bones into paste, mixing these with barley flour. With this compound they feed the dogs. These dogs have been trained so thoroughly that when the funeral ceremony takes place they all form in line and stand patiently, like people buying tickets at a railway station, awaiting their turn for the feast.

Dogs abound in Tibet. Since the Tibetans believe that men are transformed into dogs after death, the people worship dogs as gods. Dogs, therefore, are regarded as

INSCRIPTIONS ON THE MEDICAL HILL

TWO LAMAS READING



YAK SADDLED, READY FOR TRANSPORT OF GOODS

COURT WALL BUILT OF YAK HORNS

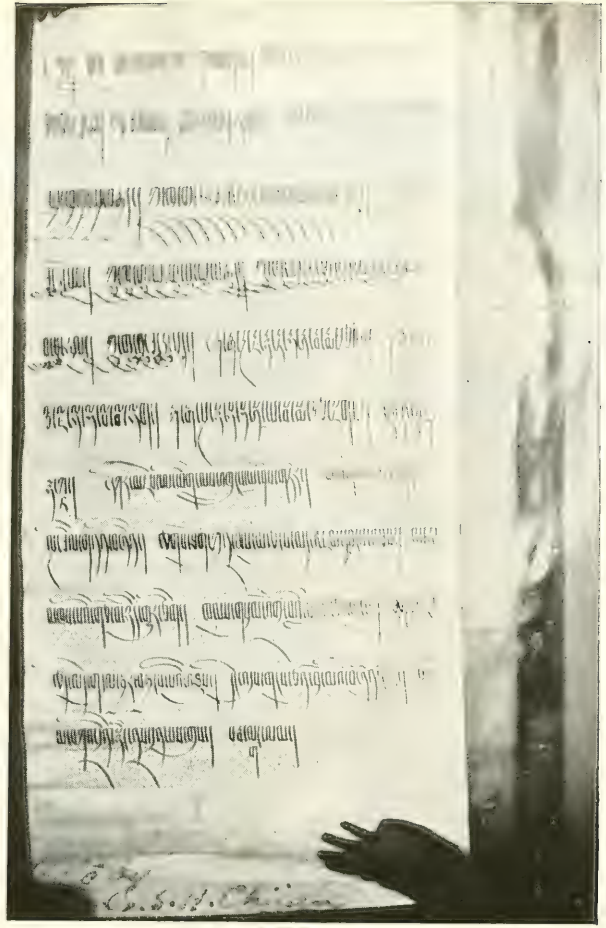
YAK-HIDE BOAT ON THE RIVER BANK LOADED WITH WOOL

The boat is built of willow branches covered with yak-hide. Its lightness makes it easy to navigate. But it is so frail that a blow from one's heel may make a hole in the boat. Persons are often drowned in this way.

YAK-HIDE BOATS CARRYING PASSENGERS ACROSS THE RIVER (SEE TEXT, PAGE 985)

TABLET 50 FEET HIGH, MADE OF BUTTER ENTIRELY, IN VARIOUS ELABORATE DESIGNS, SUPPORTED BY A WOODEN SHELF

Tablets like this, 108 in number, are erected in all parts of the city at nine o'clock on New Year's eve. All are thrown into the sacred river early the next morning as a sacrifice to the river god. This photograph was taken by flash-light. The size of the tablet can be realized by comparing it with the



HANDWRITING OF THIRTY-SIX TIBETAN WORDS

A TIBETAN SCHOLAR WRITING A DOCUMENT WITH PEN AND INK

A TIBETAN ILLUSTRATING THE "SECOND METHOD" OF WRITING
(SEE TEXT, PAGE 986)

A TIBETAN BLOWING A TRUMPET MADE OF A HUMAN THIGH BONE, DECORATED WITH GOLD, SILVER, AND PRECIOUS STONES

In his left hand is a small drum made out of two skulls (see text, page 994)

A TIBETAN EATING "TZANG-BA" (BARLEY FLOUR) FROM A BOWL MADE OUT OF A HUMAN SKULL

PRAYER WHEELS PROPELLED BY WIND (SEE TEXT, PAGE 985)

STONE SQUARE WHERE BODIES OF THE DEAD ARE CUT TO PIECES AND FED TO DOGS
Thousands of human bodies have been dismembered here (see text, page 986)

A TIBETAN MASTIFF

This red-eyed, lion-like animal is very wild and hard to tame. The dog has to be bought together with the keeper, since no other person dares to feed and deal with it

public property in Tibet and eat and sleep where they please.

Another mode of disposing of the dead is by throwing the corpse into the sacred river. The most extraordinary thing about this custom is that after the body has been thrown into the river it is taken out by some one else, who waits farther down the stream. The dead body is then cut to pieces; the thigh bones are used to make trumpets and eating bowls (see page 992) and drums are made of the skull. The beads of rosaries are also made of human bones.

BUDDHA AND "DEVIL ATTENDANTS" WATCHING AND DIVERTED BY THE "DEVIL'S DANCE"

DEVIL'S MASQUERADE IN TIBET

Tibetans celebrate the New Year and other festivals by wearing masks of various kinds

CHINA'S TREASURES

By Frederick McCormick

Author of "Present Conditions in China," in the National Geographic Magazine

FAINT echoes of China's inscribed, sculptured, and wrought memorial wealth have reached the world through travelers' tales and erudite researches by sinologues. Hitherto the image in the popular mind of the monuments of China had for its center some poetical structure like the "stately pleasure dome" of Kublai Khan imagined by Coleridge in his poem "Cambaluc":

"In Xanadu did Kubla Khan
A stately pleasure dome decree;
Where Alph, the sacred river, ran
Through caverns measureless to man
Down to a sunless sea.

"So twice five miles of fertile ground
With walls and towers were girded round;
And there were gardens bright with sinuous rills,
Where blossomed many an incense-bearing tree;
And here were forests ancient as the hills,
Enfolding sunny spots of greenery."

Coleridge could not have selected a phrase more apt than "stately pleasure dome" had he intended to call attention to the best-known form in Chinese architecture and among China's monuments. Like so much of the wrought beauty of China, such as is still seen in parks and gardens, pagodas are the work of the Buddhist church almost exclusively. Perhaps none of them are older than 900 years and most of them were built by the Ming dynasty, 1368-1644 A. D.

The most beautiful specimens are in the Yangtse Valley, where pagodas are most numerous. Every important Chinese and Manchurian city is garlanded with them. From the walls of Peking a dozen pagodas and towers may be counted within the city, and with a good glass half a dozen famous ones may be seen rising from the surrounding plain.

Materials of sacred import are incorporated in these structures. In the western park, adjoining the Forbidden City, is a famous white pagoda, part of the stones of which were brought from a mountain in Honan province by the Kin Tartars.

Another white pagoda, which stood in the western hills, 12 miles from Peking, was constructed of stamped bricks, many of which had this inscription: "The Buddhist doctrine comes from the Cause. I say there is a Cause. The Cause vanishes. I do according to this saying." The last sentence has been interpreted by a Chinese scholar as meaning: "When the Cause is vanished, still I make this declaration."

As Buddhism is in a state of arrested development, nearly all pagodas are lapsing into ruin. At the same time the ruin of the pagodas has been singularly assisted in China by European armies in 1844, 1860, 1900, and 1904.

March 9, 1905, the Russian army south of Mukden blew up a small pagoda in its retreat in order that it would not be a landmark to the Japanese artillery. The debris was used by the Japanese to mend roads. The white pagoda in the western hills, just mentioned, was destroyed September, 1900, by troops of the allied powers. It was a beautiful pagoda and its loss was lamented more by foreigners, perhaps, than by Chinese. Vandalism in China has not been confined to any race or civilization. The revolutionist soldier of 1911 used an ancient tower on the lower Yangtse as an artillery target.

Pagodas range in height from 20 to more than 200 feet, and are of various shapes—round, square, hexagonal, octagonal, etc. They always have an odd number of stories, ranging usually from seven to nine, and sometimes possessing 11 and even 13. The famous porcelain pagoda at Nanking, which, according to Longfellow, was a "blaze of colors," and which was destroyed in 1844 by foreign troops, was 261 feet high. So far as I know, there is only one other pagoda in the Chinese Empire of this height. The

Photo and Copyright by Underwood & Underwood

A VERY BEAUTIFUL PAGODA AT SOOCHOW, CHINA

Like the church spires of western lands, China's pagodas beckon the beholder to shrines or temples

Photo by direction of Mr. Charles L. Freer

THE FAMOUS "IRON" PAGODA AT KAI-FENG

This pagoda is built largely of glazed tile or porcelain. There are probably 2,000 pagodas in China. They always have an odd number of stories, usually ranging from seven to nine. This is one of the tallest in the late Empire and the new "Republic."

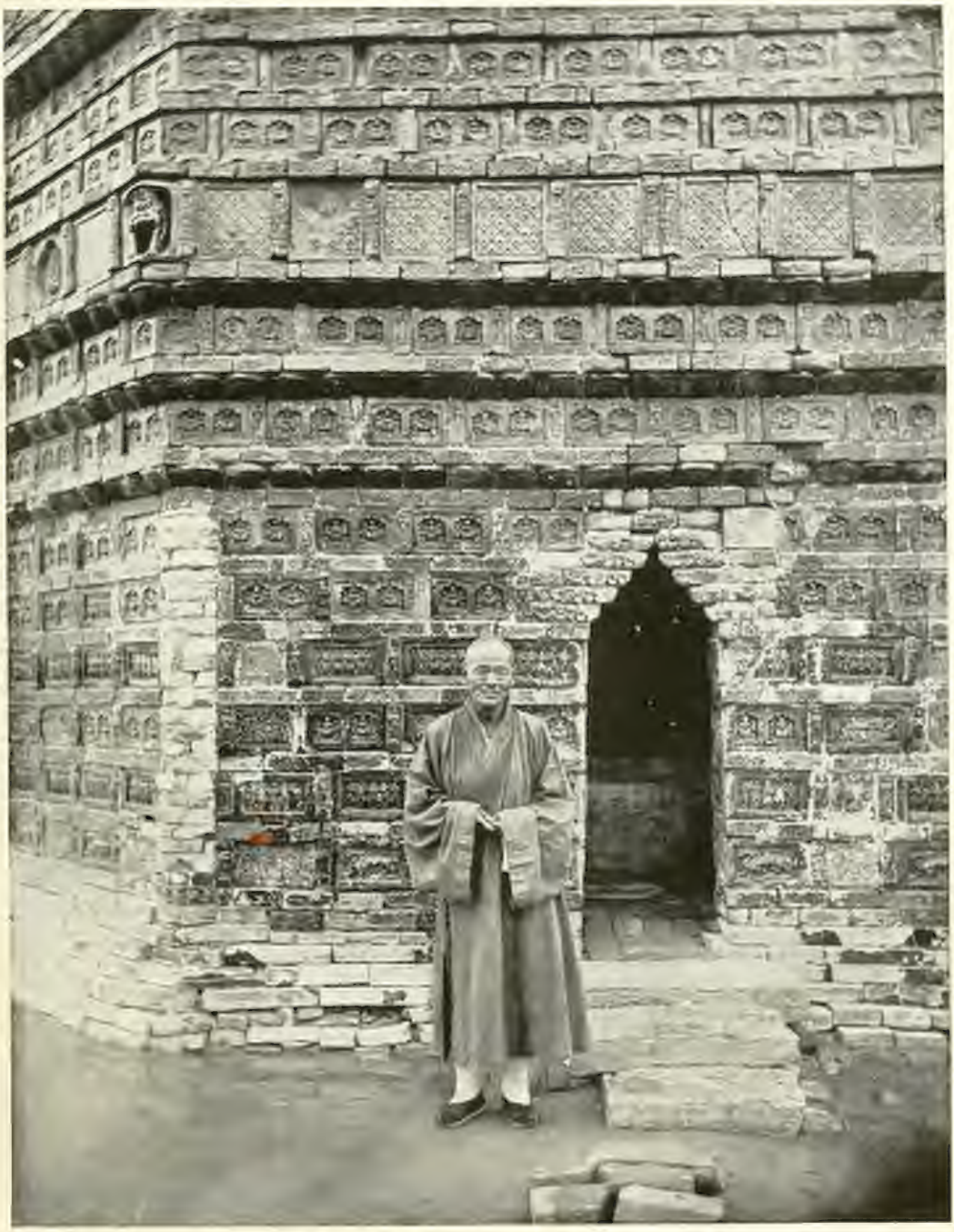


Photo by direction of Mr. Charles L. Freer

A DETAIL OF THE "IRON" PAGODA AT KAI-FENG, SHOWING SOME OF THE PORCELAIN TILES OF WHICH IT IS LARGELY CONSTRUCTED

height of the Pai T'a, or White Pagoda, at Fuchau, is also given as 261 feet.

Pagodas built of tiles, after the manner of the porcelain pagoda, are quite rare in China now. An example of a small but very beautiful one is in the Summer Palace near Peking. Another worth noting, though not entirely of glazed tile or porcelain, is that at Kai-feng, called the Iron Pagoda (see page 999).

The number of pagodas in China has never been ascertained, and perhaps the only estimate ever made is that by the distinguished American sinologue, S. Wells Williams, who placed the number at "nearly 2,000" for the Empire. Like the church spires of western lands, China's pagodas beckon the beholder to shrines or temples frequently associated with them. But there have been other reasons for the building of these graceful objects.

The Chinese have appropriated the pagoda as a counterpoise to evil and used it subject to their rules of geomancy. They adopted it in the expansion of their ideas of "Fung-shui" (Good and evil influences).

At the city of Tung, in the Peking plain, a region in past years visited by earthquakes, there is a prominent pagoda which at one time had more than 1,000 bronze bells suspended from its cornices, most of which are still in place. The people have this story as to its construction: A water owl lives underground at this place and when he shakes his tail it causes earthquakes. Geomancers located the end of his tail, and the pagoda was built on it to hold it down. At the same time this did not prevent the water owl from winking his eyes; but, as his eyelids have not been accurately located, a second pagoda has not yet been built. As a result, tremblings of the earth still occur.

To Chinese their pagodas begin to appear as landmarks of a stage of civilization to be discarded. On the eve of the rebellion of 1911 the Chinese press at Shanghai for the most part was adverse to the continued use of the Lunghwa pagoda, six miles away and one of the best-known in China, with its buildings, for the purposes of superstitious worship. Under the republic the disposition appears to be to convert the temples into modern schools, in which case the pagodas will become monuments to the age of geomancy and to the period of the revival of Buddhism.

Nothing can interfere with their grace and beauty. Denizened by birds and often dotted with vegetation, they are the pride and inspiration of the townspeople. They stand for generations like sentinels, often long after the temples to which they have belonged have disappeared. Pagodas are one of the noble gifts which Buddhism has conferred on China.

MEMORIAL ARCHES TO WOMEN

There is but one architectural object to be found in China that may be said to compete in grace, beauty, and numbers with the pagoda. This is the p'ai-lou, or commemorative arch. There are usually three arches, the central one being the largest. The most splendid of all the p'ai-lous, perhaps, is the one of five arches in front of the Ming tombs near Peking (see page 1006); but the most famous is said to be the one of colored tiles at the Hall of the Classics at Peking. It is not usually known that there is a duplicate of this p'ai-lou in the western park adjoining the Forbidden City.

The p'ai-lous have been almost exclusively erected in honor of deities, worthy men, and virtuous women. None are more impressive than those erected, at great cost, to faithful virgins, or to devoted wives, symbolized in Chinese legend and art by the fabled phœnix, that having once selected her mate never changes (see page 1002).

Such memorials, which are many in China, represent a national expression of that regard for women which the Indian king manifested in the building of the Taj Mahal in memory of his wife—called the most splendid tomb ever built to woman.

Among China's most durable monuments are her bridges, the greatest display of which is perhaps along the Grand Canal. A spectator has described their various forms as "hump-back, horseshoe, spectacle, camel-back, and needle-eye."

The openings are often very narrow, but very high, sometimes on a narrow canal rising 50 feet from the water. The ornamentation of bridges in China is

characteristically original. Balustrades have sculptured tigers, dogs, monkeys, and other apocryphal animals, and the approaches and arches are ornamented with guardian lions and dragon-head gargoyles.

The "camel-back" bridge, which abounds from one end of China to the other, is not less graceful nor less beautiful than the pagoda or p'ai-lou. Like the pagoda, it is one of the frequent objects that, as a background in Chinese scenes, served the occidental artist and engraver in conveying to the peoples of western countries the first impressions of China. It is the "pole vault" in bridges, springing from the banks of narrow canals and giving wide berth to the masts of canal vessels.

China has bridges and remains of bridges with an antiquity of 2,000 years and more. Bridges still in use saw their construction contemporaneous with the oldest architectural remains in China. The so-called Marco Polo bridge, 12 miles from Peking, is perhaps the best-known to travelers. It has 11 arches and was built in the eleventh century of our era.

In connection with the bridges ought to be mentioned, among China's monuments, the Grand Canal (see article on Canals of China, pages 931-958, in this number), which shares with but one other great construction in China the distinction of being the best-known monumental work of the Chinese. It was as magnificent a scheme in its time as is the Suez Canal, or the Panama Canal today. It had its origin in the merging of minor canals, and even today is still a grand trunk line, affording inland communication with almost the whole water system of China.

What the Grand Canal means in the life of the people and what it meant in

Photo by W. Perceval Yetts

A TYPICAL PAGODA AT WU-HU IN ANHUI

Note the trees and shrubs growing on the pagoda. To Chinese the pagodas begin to appear as landmarks of a stage of civilization to be discarded.

Photo by A. T. Granger

ROW OF ARCHES (P'AI-LOUS) ERECTED TO THE MEMORY OF WIDOWS WHO REFUSED TO MARRY A SECOND TIME: NOTE THE PHŒNIX (SEE PAGE 1000)

the past, like some of China's most ancient bridges, may be seen and realized today. In this her canals and bridges are unlike forgotten cities and capitals once their contemporaries, and unlike China's centers of art and learning, only fragments of whose buildings remain.

The wonder inspired in the breast of the traveler who visits China's vast remains of abandoned capitals, extensive temples ranged in successive courts and on terraces of the mountains, its pagodas, p'ai-lous, bridges, and canals, is equaled by the awe inspired by the silence and splendor of the tombs of China's emperors. The tombs of the kings of the "Six Kingdoms" in Shantung, though now only earthern pyramids terraced with little fields, have the air of the Pyramids of Egypt.

The Ming tombs, near Peking, are the most famed in our day, perhaps, because they are relatively in a good state of preservation and are accessible to travelers. They are approached through the five-arched stone p'ai-lou already mentioned (see page 1006) and by an avenue of stone animals nearly 2 miles in length (see pages 1007-1011). The sacred buildings are placed on the southern slope of the mountains and nearly inclosed by their encircling spurs.

Photo by E. H Wilson, Arnold Arboretum

A MEMORIAL ARCH (P'AI-LOU) OF OLD GRAY SANDSTONE, ERECTED IN HONOR OF A VIRTUOUS WIDOW: WESTERN CHINA

In every part of China these commemorative arches abound. They are erected at great cost in tribute to faithful virgins or devoted wives, symbolized in Chinese legend and art by the fabled phœnix that, having once selected her mate, never changes.

Photo by E. H. Wilson, Arnold Arboretum

THE TOMB OF TWO WEALTHY MEN (FATHER AND SON), WITH VERY ORNATE MURAL SCULPTURING: WESTERN CHINA

China is a country of practical immortality, where, in a sense, men never die and tombs are the habitations of the living. What their tombs have meant to the Chinese can best be comprehended when it is remembered that this is the people of ancestral worship, where the desecration of a tomb is the most terrible and heinous of all offenses.

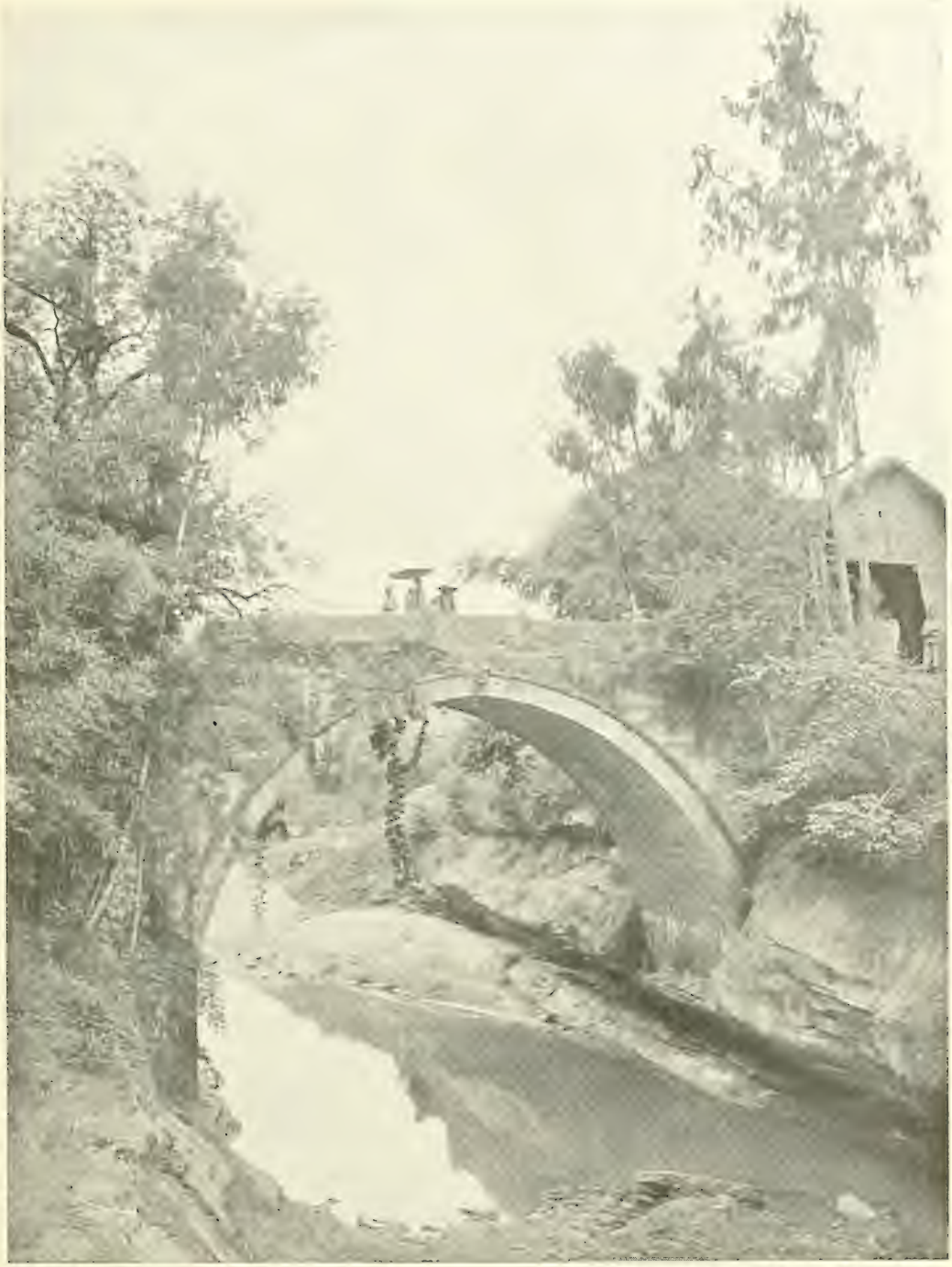


Photo by E. H. Wilson, Arnold Arboretum

A CHARACTERISTIC CHINESE BRIDGE, WITH CYPRESS, BAMBOO, AND PISTACIA CHINENSIS

Among China's most durable monuments are her bridges, the greatest display of which is perhaps along the Grand Canal. A spectator has described their various forms as "hump-back, horse-shoe, spectacle, camel-back, and needle-eye." Like the pagoda, it is one of the frequent objects that, as a background in Chinese scenes, served the occidental artist and engraver in conveying to the peoples of western countries the first impressions of China. China has bridges and remains of bridges with an antiquity of 2,000 years and more (see pages 1000-1001).

THE FIVE-ARCHED P'AI-LOU AT THE ENTRANCE TO THE "HOLY WAY," IN THE VALLEY OF THE MING TOMBS (SEE TEXT, PAGE 1000)

"There is no other similar heirloom of architecture in China that can equal it in workmanship or design. The carving on its towering façade and the base of each of its six columns and springers, each representing a solid marble slab 10 to 25 feet long, are truly regal, and only surpassed by the celebrated 'Altar of Heaven' at Peking."—Photo and note by Arthur J. Lowell.

Photo by S. S. Howland

PILLARS ALONG THE HOLY WAY: THE MING TOMBS

The avenue of marble animals can be seen in the central background

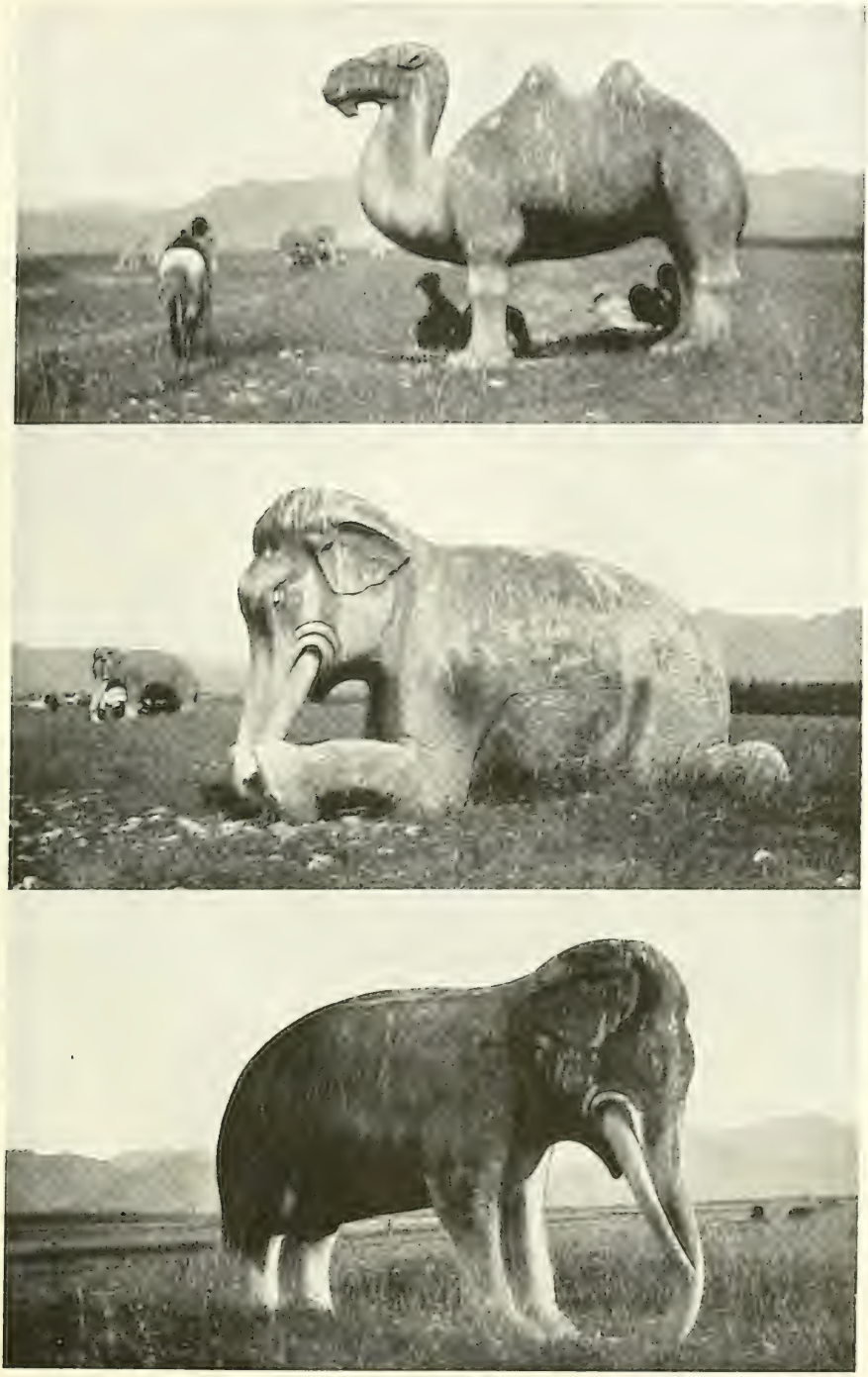


Photo by S. S. Howland

STANDING CAMEL AND ELEPHANTS: THE MING TOMBS

"The animals that stand sentry on either side of the Holy Way, as you pass from the great five-arched p'ai-lou to the tombs beyond, are left to subsist upon desert dust and a barren despoliation, where once grew trees of a dozen varieties and all the greenery of the Flowery Kingdom. These animals are the delight of every tourist that has ever visited Peking, but if another generation of tourists are permitted to admire them, with no restraint upon their privileges, they are doomed."—First two photos and note by Arthur J. Lowell.

Photos by William Downs and Percival Tattersfield

Photos by Percival Tattersfield and S. S. Howland

KNEELING CAMEL, LIONS, AND FABULOUS ANIMAL: THE MING TOMBS

Photos by Arthur J. Lowell and S. S. Howland

STANDING HORSE, STANDING LION, KNEELING HORSE: THE MING TOMBS

Photo by S. S. Howland

AN ANCIENT SOLDIER: THE MING TOMBS

The place has an inspiration to all travelers. In front of the tomb of Yung Lo there is a sacrificial hall that is one of the largest buildings in China, and is perhaps only exceeded in dimensions by the T'ai Miao, or ancestral temple of the Manchus, attached to the Forbidden City, Peking.

The Mings were great tomb-builders. They revised the ancient law fixing the

Photos by Percival Tattersfield

ANCIENT SAGE ANCIENT SOLDIER

Two prominent figures in the avenue of marble animals leading to the Ming Tombs

height of graves for all classes. By its provisions graves may range in height from 4 feet for the common people to 16 feet for officials of the first rank. This was a reduction in height of graves from previous times. The Mings thought the matter very important, and this can be readily understood from the fact that in China the dead have from the remotest times received at least imperial consideration on an equality with the living.

China is a country of practical immortality, where, in a sense, men never die and tombs are the habitations of the living. What their tombs have meant to the Chinese can best be comprehended when it is remembered that this is the people of ancestral worship, where the desecration of a tomb is the most terrible and heinous of all offenses.

In the matter of tomb-building, the Emperor of the "Three Kingdoms," 220-265 A. D., greatly exceeded the Mings. He ordered his son to build for him 72 tombs, so that his enemies would not know which contained his tablet. The achievement may be noted of another ancient emperor who constructed his tomb and then built, peopled, and garrisoned a city near by for its protection. Perhaps the Chinese, who have performed the greatest of engineering feats, have surpassed the Egyptians, Persians, and Greeks in this direction also.

Older than these, and what may be called the one shrine in all China green with the devotion of the people, is the tomb of Confucius in Shantung. Here worship continues through the ages, under the patronage of all dynasties, since the fifth century A. D., when the Emperor Kao Ti set the example of imperial sacrifice there.

As time went on the different dynasties neglected the tombs of their predecessors, so that now the tombs of the Manchus are the best specimens of mausolea in China.

The Manchus followed the Chinese custom and law in respect to their ancestors. Solemn juniper forests inclose their sepulchers, which are approached through magnificent p'ai-lous and are

Photo by Arthur J. Lowell

NANKING: ONLY TWO OF THE MING EMPERORS ARE BURIED HERE, WHILE THIRTEEN ARE BURIED IN THE VALLEY OF THE MING TOMBS NORTH OF PEKING (SEE PAGES 1006-1011)

preceded by stately buildings. There are no less than five imperial Manchu burial places. The original is at Hsin-king, eastern Manchuria, and is called the Yung Ling. Two are at Mukden and two in the region of Peking.

THE FOREST OF TABLETS

The most widely distributed and most numerous of all monuments in China is the tablet called by the Chinese "Pei." Architecturally insignificant, it is yet to the historian the most valuable and to the antiquarian the most satisfactory of all. It is the kernel within the nut of Chinese archæology, commemorating every kind of deed, doing honor to deity, fulfilling the offices of the library, preserving history, and directing the wayfarer.

The usual form and structure of the tablet is that of a single slab of stone, with its crest of the heads and curved backs of four dragons and mounted on the back of a tortoise carved from a separate stone (see page 1014). Three hundred of these stone tablets in the Hall of Classics at Peking preserve the authorized texts of the Chinese classics.

To Christendom the most interesting and famous of the tablets of China is the Nestorian at Hsi-ngan. It gives in 2,000 Chinese characters, only one of which is illegible, a record of the earliest known Christian mission in China, and is dated A. D. 781. It has

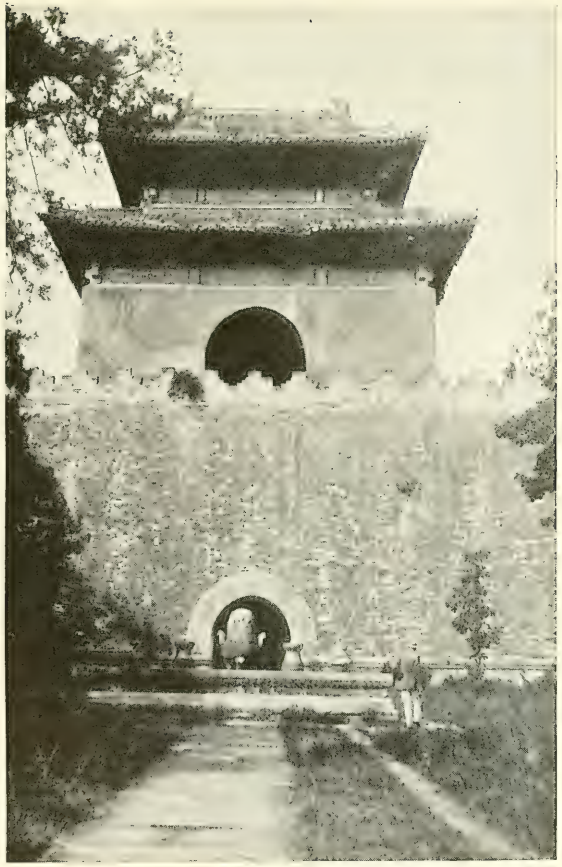


Photo by Arthur J. Lowell

TOMB OF THE EMPEROR YUNG-LOH, TO WHICH THE AVENUE OF ANIMALS LEADS (SEE PAGE 1002)

Photo by S. S. Howland

A BUTTRESS OF THE OLD WALL OF CHINA

To the Great Wall all other monuments of China, and for that matter of the world, are as pygmies to a giant. It is by far the most extensive and formidable single structure ever devised by man (p. 1023).

Photo by E. H. Wilson, Arnold Arboretum

TURTLE STONE, 35 FEET HIGH, A FINE EXAMPLE OF THE MOST NUMEROUS OF ALL MONUMENTS IN CHINA, THE "PEI"

These tablets greet the traveler at every yamen, temple, mountain pass, by the roadside and tomb, etc. (see page 1012).

Architecturally insignificant, it is yet to the historian the most valuable and to the antiquarian the most satisfactory of all China's monuments. It is the kernel within the nut of Chinese archæology, commemorating every kind of deed, doing honor to deity, fulfilling the offices of the library, preserving history, and directing the wayfarer. The usual form and structure of the tablet is that of a single slab of stone, with its crest of the heads and curved backs of a tortoise carved from a separate stone.

Photo by S. S. Howland

CH'IEN MEN; THIS IS THE PRINCIPAL GATE OF THE NINE GATES OF PEKING; IT IS THE ENTRANCE TO THE FORBIDDEN CITY

been carefully treasured by Christian missionaries since the Christian church became aware of its existence through the Roman Catholic fathers, 1625 A. D.

Several years ago the governor of the province of Shensi, where it was found, placed it in the Pei-lin (Forest of Tablets), at Hsi-ngan, for protection against vandals. The Pei-lin is a collection of more than 1,400 historical records in stone, both pictorial and otherwise, running back 12 centuries, and the greatest collection in the country. Not less curious than the Nestorian tablet are the two tablets at Kai-feng, province of Honan, commemorating an ancient and now extinct Jewish colony at that place.

Tablets greet the traveler at every yamen (official residence), temple, bridge, mountain pass, by the roadside and tomb, and in the faces of walls where they are incorporated. In eastern China pavilions are built over them, while in the west of China they are framed in bricklike doors and are called "tao pei," or road tablets.

A curious tablet exists at Nanking to commemorate the visit there of the Emperor Kang Hsi and reproving the inhabitants for their extravagance and prodigality.

In Manchuria, near the Yellow River, is a tablet more than 18 feet high that is interesting, at this time of Japanese expansion on the continent, because of the fact that it mentions the Japanese by a nickname.

Another of interest is used to cover a well under the famous Golden Hill at Port Arthur. It records the fact that a Chinese envoy passed that point during the Middle Ages on a mission to the court of one of the Manchurian kings of the period.

Perhaps the latest tablets to be erected in connection with the imperial court are those in commemoration of incidents in the flight of the late Empress Grand Dowager and the Emperor Kuang Hsu to Hsian-fu in 1900. At Chu-yun-kuan, in the Nankou Pass, through which the court passed in its flight, the traveler is struck by a tablet over the gateway reading, "First Gate of the World"—this being the chief entrance to China from Tartary. But within the entrance of the

Photo by direction of Mr. Charles L. Freer

THE INTERPRETER, SOLDIERS, AND SERVANTS OF MR. CHARLES L. FREER WHILE AT LUNG-MEN, STUDYING THE ROCK TEMPLES

Photo by direction of Mr. Charles L. Freer

SCENE ALONG THE YI RIVER, WHOSE ROCK CLIFFS HAVE BEEN HONEYCOMBED BY THE QUARRIED TEMPLES SHOWN IN THE FOLLOWING PHOTOGRAPHS

Chinese archæologists say this limestone mountain was cut in two to make a passage for this river and to divert its waters from the Yellow River, called "China's Sorrow" because of the destructive nature of its floods

Photo by direction of Mr. Charles L. Freer

A PORTION OF THE ROCK CLIFF OF THE YI RIVER, SHOWING A FEW OF THE THOUSANDS OF TEMPLES AND SACRED RECESSES CARVED OUT OF THE ROCK AT LUNG-MEN

The most wonderful of Buddhist sculptures, and indeed of all known sculptures in China, are the rock-hewn temples of Lung-men in the province of Honan, 10 miles south of the city of Honan—a railway terminus. Its name means "dragon door". It is a channel for a river cut through a limestone mountain—an artificial defile which tradition says was cut by the Emperor Yu with the aid of a dragon.

Photo by direction of Mr. Charles L. Freer

ANOTHER VIEW OF THE ROCK-HEWN TEMPLES AT LUNG-MEN

The huge Buddha and attendant figures in the central recess can be clearly seen. Many smaller figures and decorations in other recesses can also be discerned. "Here, in the seventh century, in the sides of the cloven range, wrought the sculptors, who, like the Greek masters of the chisel, remain unknown. Here the Chinese artists turned the precipitous cliffs into hundreds of quarried temples and sculptured recesses, peopled with religious figures in relief or detached."

pedestal of what was once a great pagoda here there are tablets bearing inscriptions in seven languages, some of the latter long since dead.

The historical value of the inscriptions in China has hardly begun to be realized. At Hangchau, one of the two cities which, according to a Chinese proverb, reconciles the soul to this world until Heaven is reached, there was, until recent years, an invaluable iron plate of the tenth century with an inscription recording the building of the wall of the city by the feudal Prince Chien, whose descendants still reside there.

But of all stone monuments in China valuable for the antiquity of their inscriptions, the stone "drums" in the Confucian temple at Peking are the most remarked. They are supposed to record the hunting exploits of King Hsuan, B. C. 827, making them more than 2,700 years old. The translations of their inscriptions are generally made from rubbings taken in the Sung dynasty—A. D. 960-1127—because the inscriptions are almost wholly illegible now, and only here and there can a character be traced.

THE FAMOUS ROCK TEMPLES

Just as universal as her temples, p'ailous, and buildings with imperial significance, and almost as universal as her tombs and tablets, are China's figure-sculptures. The Buddhist church, which has been the builder of most of the temples and pagodas, the maker of gardens, and the protector of flowers, trees, birds, and animals, has been the promoter of art and the inspiration of the most of China's sculptures.

Singularly enough, the most notable sculptures in China are in the rock walls of mountains and in caves. Rockhill, the American orientalist, describes one of these, a Buddhist colossus near Kwei-Kwa-cheng, northwest of Peking, and another near the city of Ning, in Kansu.

The largest and most notable colossus of Buddha in China known to occidentals is that described by S. Wells Williams. It is in Shensi, near the town of Pin, and is said to have been cut by an emperor of the Tang dynasty in the ninth century. It is hewn from sandstone so as to leave it in a cave. It is 56 feet high and covered with color and gilt. According to Williams, it "is lighted from above, after the manner of the Pantheon, a single round opening in the vaulting. Sixty feet over the rock temple rises a tiled roofing, and upon the hillside without the cavern are a number of minor temples and statues".

But no doubt the most wonderful of Buddhist sculptures, and indeed of all known sculptures in China, are the rock-hewn temples of Lung Men in the province of Honan, 10 miles south of the city of Honan—a railway terminus. Its name means "dragon door". It is a channel for a river cut through a limestone mountain—an artificial defile which tradition says was cut by the Emperor Yu with the aid of a dragon.

Here, in the seventh century, in the sides of the cloven range, wrought the sculptors, who, like the Greek masters of the chisel, remain unknown. Here the Chinese artists turned the precipitous cliffs into hundreds of quarried temples and sculptured recesses, peopled with religious figures in relief or detached.

There are thousands of figures among these sculptures, varying in height from a few inches to 50 or 60 feet. They show Indian influence and represent all the members of the Buddhist pantheon. A group which occurs with great frequency is that of Buddha attended by his two favorite disciples, Ananda and Kashiapa, and two Bobhisattwas. The Devarajas, Guardians of the Gates, are rendered with great power.

The only sculptures at this place not of Buddhist character are several bas-reliefs, which, in the opinion of the French orientalist, Prof. Chavannes, are representations of donors who have contributed to the extensions of this great decorative work. These afford an interesting study of costumes in China in the seventh century of our era.

The only other sculptures in China on a scale with the Buddhist images are the stone figures of men, elephants, camels, horses, and unicorns, notably at the tombs of the Mings and the Chings near Peking and Mukden. Those at Nanking are also well known (see pages 1006-1011).

Photo by direction of Mr. Charles L. Freer

THE GREAT BUDDHA, OVER 50 FEET HIGH, IN THE CHU CHIAN FUNG TEMPLE: LUNG-MEN (SEE ALSO PRECEDING PICTURE)

There are thousands of figures among these sculptures, varying in height from a few inches to 50 or 60 feet. They show Indian influence and represent all the members of the Buddhist pantheon.

Photo by direction of Mr. Charles L. Freer

THE GUARDIAN TO THE TEMPLE OF NAN TUNG: LUNG-MEN

THE GREAT WALL OF CHINA

To the Great Wall all other monuments of China, and for that matter of the world, are as pygmies to a giant. It is by far the most extensive and formidable single structure ever devised by man. Built in the third century, it has never yet been surveyed, but is believed to have a continuous extent of 1,500 miles, to which must be added the extent of branch walls.

After 16 centuries it remains intact for hundreds of miles, a brick or dressed granite shell filled with earth and covered with an impervious paving of brick laid in lime, carefully drained. It is protected by crenellated parapet and fortress towers.

It seems to lie upon the mountains, spurs, and ridges like a great serpent. The wonder inspired in the breast of the traveler who visits China's other monuments, such as the vast and abandoned capitals, is that of a dead past. But he who stands upon the Great Wall, lifted to some airy peak, and there rocked by its sinuous undulation, sees the China of the third century living.

The Great Wall was built by the Emperor Shih to protect the peaceful inhabitants of the plains from the hill barbarians of Tartary, serving a useful purpose in defense, at intervals of time, for ages The innumerable tablets and inscriptions which it bears, recording its construction and repair, would form a curious and instructive history.

Watch-towers dating from the third century still stand sentinel outside the Great Wall, while unnumbered hundreds of lesser antiquity stand guard on the imperial highways of all China. A chain of them extends from Mukden via Peking to Hsi-ngan, and thence to a point beyond the western end of the Great Wall.

Here is a story giving a glimpse of the place these picturesque objects have played in the lives of the Chinese: Nearly 2,700 years ago (781 B. C.) the Emperor Yu commanded that the beacons on all the watch-towers in the Empire be lighted, so that by the chagrin of the princes in rushing to the defense of the capital when there was no danger he might cause a smile to come over the face of one of his haughty beauties, Pao Ssu. Pao Ssu laughed.

However, one of the onlookers of this comedy was the Emperor's enemy, the hostile Duke of Hsin. Hsin regarded it as a favorable time to invade the kingdom of Yu and did so. The Emperor again ordered the beacons lighted, but the princes refused to respond. The capital fell, the Emperor was slain, and Pao Ssu was carried into captivity, where she strangled herself.

THE BURIED WEALTH OF CHINA IS BEYOND CALCULATION

One can only guess what may be the buried monumental wealth of China, a land in which so far no excavations for the purpose of discovery have yet been made. There must be innumerable objects of great historic and archæological value. For ages in central China, in regions subject to flood and to burial by alluvial deposits, antiquities have been dug up, the latest discoveries occurring where excavations have been made for railways. These include sculptured figures showing ante-queue fashions. About the middle of the last century 11 bells 2,000 years old were dug up in Kiangsi province, and are said to be in the Forbidden City.

When excavations were made in Peking for the Foreign Office buildings large hollow bricks were found 4 feet in length by 20 inches in width and 5 inches in thickness. They had a clear ringing tone when struck and were known to Chinese as "music-stand bricks". They were said to have originally come from the region of the Yellow River and to have been used as stands for musical instruments. But they are ornamented with a geometrical pattern and were probably used in friezes.

The extent of China's archæological relics is something that remains to be determined. From what the traveler can see, and the student as well, they appear to be immense, in keeping with the dimensions of her history.

There is probably nothing monumental in China that is older than the remains of her cities (unless it be her tombs) and nothing of more absorbing interest than the remains of her ancient capitals.

Photo by direction of Mr Charles L Freer

A PORTION OF THE CLIFF, SHOWING CARVED DECORATIONS AROUND THE ENTRANCE TO THE TEMPLE CHEIAN SHE-SU AT LUNG-MEN

Photo by direction of Mr. Charles L. Freer

A CHARACTERISTIC CARVED GROUP: CHU CHIAN FUNG, LUNG-MEN

Photo by direction of Mr. Charles L. Freer

SEVERAL OF THE LARGEST TEMPLES ARE KNOWN BY THE ONE NAME, "PING YUNG TUNG": LUNG-MEN

Photo by direction of Mr. Charles L. Freer

ONE OF THE LARGE FIGURES CARVED IN THE ROCK AT LUNG-MEN

Photo by direction of Mr. Charles L. Freer

DETAIL OF CARVING ON THE WALL: PING YUNG TUNG, LUNG-MEN

The only sculptures at this place not of Buddhist character are several bas-reliefs, which, in the opinion of the French orientalist, Professor Chavannes, are representations of donors who have contributed to the extensions of this great decorative work. These afford an interesting study of costumes in China in the seventh century of our era.

Photo by direction of Mr. Charles L. Freer

AN ELABORATE CORNER IN A ROCK RECESS AT LUNG-MEN

Photo by direction of Mr. Charles L. Freer

DECORATION OUTSIDE THE WAN-FOR-TUNG TEMPLE: LUNG-MEN

The three succeeding pictures are of the same temple

Photo by direction of Mr. Charles L. Freer

THE ENTRANCE TO WAN-FOR-TUNG, SHOWING THE SAME FIGURES AS IN THE PRECEDING PICTURE, AND THE DECORATIONS ON THE SIDE WALL OF ENTRANCE (SEE PAGES 1030, 1032, AND 1033)

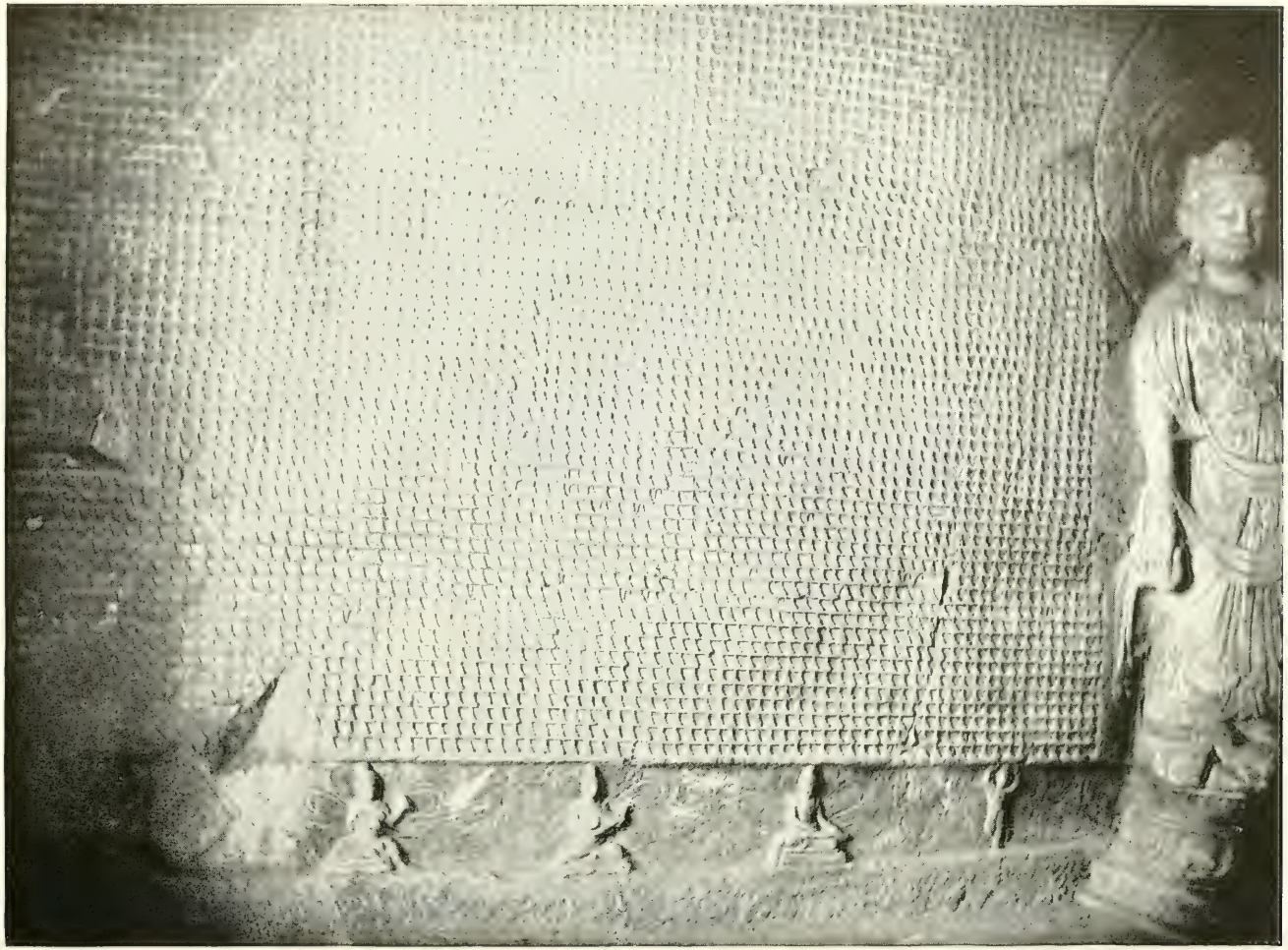


Photo by direction of Mr. Charles L. Freer

INSIDE OF WAN-FOR-TUNG TEMPLE

Note the thousands of figures of Buddha carved in the wall (see pages 1030, 1031, and 1033)

Photo by direction of Mr. Charles L. Freer

INSIDE OF WAN-FOR-TUNG TEMPLE: LUNG-MEN (SEE PAGES 1030, 1031, AND 1032)

A group which occurs with great frequency is that of Buddha attended by his two favorite disciples, Ananda and Kashiapa, and two Bobhisattwas

Photo by direction of Mr. Charles L. Freer

THE INTERIOR OF A TEMPLE, TYPICAL OF THE MANY HUNDREDS OF SACRED RECESSES CARVED IN THE ROCK CLIFFS OF THE RIVER AT LUNG-MEN

Vast and solemn ruins of the capitals of known and unknown kingdoms are to be seen throughout all China. Shangtu, the "Cambaluc" of Coleridge, has been located west of the important Mongol market at Dolonnor. Here the remains of the walls of Kublai Khan's summer capital may still be seen. Inscriptions have been found here, and it is possible that the future antiquary, studying the spot with scientific scrutiny, may make discoveries of value.

Marco Polo, the most distinguished traveler among Europeans to visit China, gave to the world what is still the only existing record of the wonders of Shangtu, of which Coleridge dreamed and wrote striking words not hitherto regarded as fact. It has been stated that Coleridge knew nothing of Shangtu, and that he derived the images of his poem from a dream, the figment of which he coined into golden measures when he had risen from his couch.

Only Shangtu and Kara Korum, of the Mongols, have been described for us by our own travelers. Perhaps a composite of the foreign accounts of these two places, with what we see of Peking, Nanking, and Hsi-ngan that still exist, together with the fragmentary accounts from Chinese history and literature, will afford approximate pictures of what must have been the aspect and substance of those wonderful places—Yang-hsia, Po, Yin, Hao, Lo-yi, Hsien-yang, Chang-an, and Lo-yang, or even of Hang-chau.

There is one feature of the capital that has remained unchanged. From a time whose identity is lost in past ages the rulers of the Chinese people have preserved an imperial shrine to Shang Ti, the God of Heaven now represented in the Altar of Heaven at Peking, perhaps the most beautiful and impressive shrine the Chinese have ever built. It is one of the most notable of China's monuments and perhaps the simplest altar to deity existing, as it is one of the most impressive man-made places in the world. The altar is of white marble, circular, perhaps 200 feet in diameter, and constructed in its details with reference to the plan of the universe. It stands amid ancient and solemn junipers, which, according to the Chinese, are the most stately and dignified objects of the vegetable kingdom.

We cannot claim to know much about China's monuments until a more careful examination has been made of the writings of China's antiquaries.

No doubt an investigation more thorough than has been made by Chinese in recent generations will result in contributing one of the most brilliant chapters to the records of the world's antiquities. It is a subject that is one of the interests of man universal and of nations in their aspect as clay in the hands of the Universal Potter.

Pumpelly, the veteran American explorer in China, has visited Turkestan in the interest of archæology. Rockhill, Huntington, Laufer, and others have contributed to American research into China's antiquities. But if for no other reason, the monuments of China must always have a special interest for Americans because of the beautiful Porcelain Tower of Nanking, immortalized in Longfellow's poem "Keramos". The part pertaining to the pagoda, which is no less beautiful than Coleridge's "Cambaluc," may be extracted from its setting as follows:

"Turn, turn my wheel, the human race,
Of every tongue, of every place,
Caucasian, Coptic, or Malay,
All that inhabit this great earth,
Whatever be their rank or worth,
Are kindred and allied by birth,
And made of the same clay.

"And yonder by Nankin, behold
The Tower of Porcelain, strange and old,
Uplifting to the astonished skies
Its ninefold painted balconies,
With balustrades of twining leaves,
And roofs of tile beneath whose eaves
Hang porcelain bells that all the time
Ring with a soft, melodious chime;
While the whole fabric is ablaze
With varied tints all fused in one
Great mass of colour like a maze
Of flowers illumined by the sun.

"Turn, turn, my wheel. What is begun
At daybreak must at dark be done;
Tomorrow will be another day,
Tomorrow the hot furnace flame
Will search the heart and try the frame
And stamp with honour or with shame
These vessels made of clay."

Photo by direction of Mr. Charles L. Freer

THIS PICTURE AND THE NEXT THREE ILLUSTRATIONS SHOW THE INTERIOR OF THE LOW-GOON-TUNG TEMPLE, ONE OF THE MOST EXTRAVAGANT IN DECORATION YET DISCOVERED

All the figures in this temple, as in all the other temples, have been carved out of the rock

Photo by direction of Mr. Charles L. Freer

INTERIOR OF THE LOW-GOON-TUNG TEMPLE AT LUNG-MEN (SEE ALSO PAGES 1036, 1038, AND 1039)

Photo by direction of Mr. Charles L. Freer

THE CENTRAL BUDDHA IN THE LOW-GOON-TUNG TEMPLE (SEE ALSO PAGES 1036, 1037, AND 1039)

Photo by direction of Mr. Charles L. Freer

ANOTHER VIEW OF THE INTERIOR OF THE LOW-COON-TUNG TEMPLE (SEE ALSO PAGES 1036, 1037, AND 1038)

Photo by direction of Mr. Charles L. Freer

THE INTERIOR OF A VERY LAVISHLY DECORATED TEMPLE AT LUNG-MEN

All the figures, as well as the cave itself, have been carved out of the rock cliff

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THE NATIONAL GEOGRAPHIC MAGAZINE

GLIMPSES OF THE RUSSIAN EMPIRE

BY WILLIAM WISNER CHAPIN

AUTHOR OF "GLIMPSES OF KOREA AND CHINA," WITH 39 PHOTOGRAPHS IN COLOR, AND "GLIMPSES OF JAPAN," WITH 34 PHOTOGRAPHS IN COLOR, IN THE NATIONAL GEOGRAPHIC MAGAZINE

With Photographs by the Author

THE trip from New York to San Francisco to the majority of people is about as long a continuous journey as they care to make, even when surrounded by the luxurious appointments with which the trains of the great trunk lines are equipped. It is therefore quite natural that we should have anticipated with some apprehension the journey from Peking to St. Petersburg, a distance more than twice as great and requiring 11½ days and nights to accomplish. Our reservations from Harbin, Manchuria, were secured and a large guarantee deposit made three months in advance. Although applying thus early, our entire party of five were unable to get compartments in the same car, so popular is this "Train de luxe," which is the only through express each week.

The coaches are vestibuled, roomy, and lighted by electricity, with the corridors at one side. A lavatory is placed between and connected with each two compartments. The berths are clean, and altogether the accommodations are very comfortable. In the baggage cars were two bath-rooms for use of all passengers, and these last-mentioned conveniences are probably the basis for the claim, as advertised, that this is the most sumptuous train in the world. The gauge of the track is 3½ inches broader than that of the trunk lines in America.

Trunk lines on our side of the world could, with great advantage to passengers, adopt the methods practiced by the Transiberian Railway of starting and stopping trains, which is entirely free from all jarring or jerking sensation.

While 90 per cent of the patrons of this road are English speaking, not one among all of the railroad or custom officials in charge of the train understand our language; so whatever *they* say has to go, and arguing on our part is wasted breath. Only 40 pounds of baggage is allowed to each passenger, but the compartments are so roomy that several suitcases can easily be stowed away.

Railroad station sign-boards in Japan and China bear the names of places both in English and in the native language, while those in Russia are only in the Russian characters.

It is unnecessary to consult a map to discover when we pass from Manchuria into Siberia, since from the car window the mud-walled compounds inclosing houses of the same material, capped with thatched roofs and of the Chinese type, give way to log houses, with now and

then a substantial frame structure having elaborate window-frames and fancy gables.

The people, too, are of large, sturdy frames. The long and neglected beards of the men give them a fierce, coarse appearance, in sharp contrast with the "childlike and bland" expression of their clean-faced Chinese neighbors.

According to our calendar, we are in the first week of July, and find our thin clothing is very comfortable; but to look at the peasants at the stations one would conclude winter had set in early. The men wear fur caps with ear protectors to turn down and magenta and other bright-colored calico blouses belted, with baggy trousers tucked into great heavy boots. The women are equally well protected by thick "non-hobble" skirts, clumsy shoes, and heads closely wrapped in kerchiefs or shawls.

Our train being a "limited," stops are made only at the more important places, at some of which 20 minutes are allowed passengers to stretch their legs.

We pace the platform, dodging the vigilant guard while gathering in a few shots with the kodak. At some of the first stops the brave guards were very annoying, almost to rudeness, threatening to appropriate the kodak if we attempted to use it. Naturally the risk only adds zest to our efforts, and but few opportunities escape.

WE RETURN TO THE LAND OF BREAD AND BUTTER

At the stations where stops are made numbers of peasants are gathered, offering at very reasonable prices that staff of life which is so much missed and so greatly craved by travelers in Japan and China—good sweet bread—sold here in a variety not only of colors, but in size, from the black loaf two feet in diameter down to rolls of ordinary size, but of extraordinary sweetness. We have, too, again resumed the habit which is said to be spreading—butter. The general cultivation of rice in Japan and parts of China make pastures scarce, so that milk and butter was there omitted from our menu. But here, on these vast meadows, are pastured great droves of handsome cattle.

The recollection of the bread, butter, Dutch cheese, wild strawberries, and cream purchased from these farmer people will always be associated with the Transiberian journey, since our lunch-basket was daily augmented by purchases of these wholesome supplies. While the food served in the dining-cars is as good as could be expected, we greatly enjoyed the occasional breakfasts and daily lunch of our own providing.

From now on to Moscow no more changes of cars will be necessary, much to our relief, as during the first five days and nights from Peking we have been enlivened by five changes of cars and several encounters with customs officials, interspersed with exhibits of our passport to any inquiring mind embodied in a form wearing Russian clothing who chanced to feel a curiosity to read some of our life's secrets contained in that document.

THRONGS OF IMMIGRANTS

Many emigrant trains are met filled with people who have been induced to pull up from the cities or more thickly settled western country to try their fortunes in the great Northeast. The Russian government is offering farms and many extraordinary inducements to settlers, and great numbers are availing themselves of the opportunity. At many of the stations these people are gathered around in family groups, using their bundles of clothing and belongings to recline or sit upon while awaiting the train which is to convey them on to their destination. Some of these tired mothers trying to quiet and relieve the wants of their crying children present truly pathetic scenes.

It seems strange that so many professional beggars are encountered at these small settlements, where employment for the unskilled must be so abundant.

On the third day of July we were disappointed when passing lake Baikal by encountering a hard rain, which prevented our seeing much of this wonderful body of water, the sixth largest lake on the globe. Its level is 1,500 feet above

the sea. Soundings have disclosed a depth of 6,500 feet, and a remarkable fact connected with this inland sea is that it is the only body of fresh water in the world in which seals thrive.

A ride of 60 miles brings us to Irkutsk, one of the largest of Siberian cities. Its future importance as a railroad center is assured, for when the present air line from Peking to Kalgan is extended to this city it will cut the distance hundreds of miles and save several days over the present Mukden route. The depot is the most pretentious seen on the line thus far. A few miles northwest of Irkutsk is located one of the largest Siberian prisons, with a capacity for many thousand convicts, and incidentally it may be noted that there is a department store in this same city in which are confined more than 200 employees.

A PLEASANT LANDSCAPE

From the car windows we observe among the forest trees many large white birch, the same variety from which the American Indians obtained bark for their canoes.

After dinner one must not depend on the approach of darkness to give warning of bedtime, since we are so near the latitude of the midnight sun that if we sleep only when darkness prevails we will get scant rest. The sun disappears after 9 o'clock, followed by twilight until 11, and about four hours later the sun is again attending to business at the old stand.

Each of the towns we pass through, however small, has one or more Greek churches within its borders, neatly painted in white; the shingled roof tinted a delicate pea green and crowned with peculiar double turnip-shaped domes, some of them in brilliant colors.

Further west one can almost imagine he is traveling through Holland, so numerous are the windmills, extending their great wooden arms to embrace any passing breeze; they make a pleasing break in the monotony of these vast prairies.

At the stations among the Ural Mountains numbers of the natives are selling souvenirs characteristic of the region, specimens of different-colored rock from the mines. It is from this region a large portion of the world's supply of malachite is secured. When cut into thin small pieces, polished and matched together like the recent popular jig-saw puzzles, it is used to veneer the surface of columns in the great cathedrals as well as in the finish of urns, vases, and table tops, which are so frequently chosen as the state gifts of Russian royalty.

As we approach the western boundary of Siberia, the ascent to the pass through the Ural Mountains has been so gradual that we do not realize our altitude until the summit is reached. Here is the line separating Europe from Asia, marked by the white marble triangular pyramid, which, if significant to the hopeful emigrant, is doubly so to the unfortunate exile, who through his tears catches a final glimpse of that land which contains all that is dear to him and where from now on he is counted as dead. How pathetically suggestive is the name of this stone, "The Monument of Tears!" To us, passing the gateway into Europe, it marks a long stride homeward and fills our minds with pleasant anticipations.

Eight and one-half days of our journey from Peking is accomplished, but so interesting have been the sights and experiences, so comfortable and restful the train accommodations, and so courteous the employees of the road, together with that all-important factor which determines for or against the pleasure of travel—agreeable companions—that we feel the time has passed all too quickly.

The reputation for ill luck sometimes attributed to number 13 was not sustained in the case of our Transiberian party, since the absence of any one of them would have been a distinct deprivation in point of pleasure to the remainder. The acquaintance of our several groups, formed while crossing the Pacific, or traveling in Japan or China, naturally produced a feeling of warm fellowship when we assembled on the "train de luxe," and, it is a pleasure to add, this feeling still continues.

GREAT STEPPES AND WINDING RIVERS

The early impressions of Siberia, formed from the very limited information contained in school books of not very long ago, in which luckless inhabitants of this country were pictured riding in peculiar-shaped sleds drawn by horses running at the top of their speed, and just about to be devoured by a great pack of hungry wolves, while those not fleeing from this awful fate were either condemned to hopeless servitude in the mines or exiled, eking out a bare existence in this land of perpetual winter and limitless forests, have not been entirely eliminated from the minds of many. Whatever the conditions may be in other parts of this great Empire, the country through which the railway passes, as well as the appearance of the people gathered at the stations, would entirely dispel such ideas.

Great steppes, winding rivers, stretches of woods, and undulating meadows are the characteristics of the country as seen on both sides of the track. The soil is very fertile; wild flowers are of enormous growth, and although the season is short, the appearance of vegetation generally indicates a rapid growth and early maturity. Of course, like other new countries, some unfavorable conditions exist which will require time and experience to overcome. In the distribution of forests and rivers, large tracts were left devoid of either; and in districts on Siberian steppes artesian wells often bring up only salt or bitter water, and wells furnishing sweet water sometimes suddenly change to salt and become useless.

RAILROAD RATES OF ONE CENT A MILE

What a wonderful achievement the building of this splendid Siberian railroad has proven. Its benefits are not confined to Russia alone, for its advantages are felt the world over, as this railway is an important factor in reducing the time required to encircle the globe.

It is cause for just pride to reflect that while credit is given an Englishman for first suggesting the building of this road, the first plans for its construction were submitted by an American. The present Tsar, who has always been deeply interested in the project, wheeled the first barrel of earth and laid the first stone May 19, 1891. So numerous are the rivers over which this railroad passes that thirty miles of bridges form part of its line.

To bring the benefits of the road within the reach of the people, the government reduced the rates of through tickets to $59.00, being about one cent per mile. It is very noticeable to tourists how few large cities are entered by this road. The cause of this may be similar to that of the line connecting Moscow with St. Petersburg, which is said to have been brought about by the officials commissioned to determine the route, who were influenced to make long detours to connect with favored localities. When the map was submitted to his Imperial Highness the Emperor, with a ruler he drew a straight line between the two cities and ordered the road built in accordance with that line; and the order was carried out.

A very unusual custom elsewhere prevails on this railway, which we observed from the rear end of our train. At all crossings the flagman stands by the side of the road until the train has passed, when he at once walks to the center of the track, still holding the flag extended, and stands like a statue until the train is out of sight. This we were informed is to enable the railroad official, who keeps tabs from the rear car, to note on his report that the flagman is on the job. As a train draws into a station a railroad official strikes one stroke on a bell, similar to a locomotive bell, which hangs outside the depot building; and about three minutes before time for the train to depart, two strokes are sounded, as a warning to passengers to get aboard. At the sound of the third and last signal of three strokes, the train-starter blows a policeman's whistle, when, if the engineer has completed oiling and taking on water, he replies with a steam whistle and the train moves off.

Unmistakable evidences of the presence of the festive mosquito are seen as our train proceeds through forest districts. Toward evening the people have their heads enveloped in black netting, and many are sitting on the lee side of smudge fires in front of their homes,

A CITY GATE OF SHANHAIKWAN

The streets of the town are narrow and without pavement. The tree rooted on top of the wall indicates the condition of neglect and decay of most of these old defenses.

A RESTING CARAVAN

Camels of many of the caravans engaged in conveying teas and other commodities between China and Mongolia are relieved of their burden for rest during the heat of the day, and at night the bales and boxes are again replaced, when the long tramp is resumed.

A CHINESE BRIDE

One of the first duties of a Chinese bride is to pay homage to her ancestors. Our picture shows the bride proceeding to the Ancestral Hall for this purpose. She is supported by two women attendants, who frequently raise her arms to salute in different directions, that no ancestor may be omitted.

THE DOCK AT WHAMPOA, ON THE PEARL RIVER

The space above the pier was filled with sampans. Many of these little craft represented the home of an entire family, and were navigated by women.

CHINESE JUNKS

The Pearl River between Hong Kong and Canton has long been a favorite place for the operations of river pirates, necessitating the presence of many government war junks, to protect the shipping.

CHINAMEN GATHERING FOR A RACE IN PEKING

The track was straight away and the contestants included horses and mules. The usual stoicism of the natives was frequently overcome by bursts of applause at the performance of some favorite steed.

CHINESE CITY EXPRESS

The list of articles an able-bodied Chinaman will carry suspended from the ends of a pole balanced across his shoulder is only limited by his strength to raise it from the ground; when a trunk or piano is the burden, the method is the same only more Chinamen are required.

CHINESE ONION PEDLER, PEKING

THE PALATIAL RESIDENCE OF SIR CHENTUNG LIANG CHANG, WHAMPOA, CHINA

Who so ably represented his government in Washington several years ago. The ornamental surroundings of the residence include, besides this artifical lake, grounds of unusual beauty, in which an attractive tea house and pergola are interesting features.

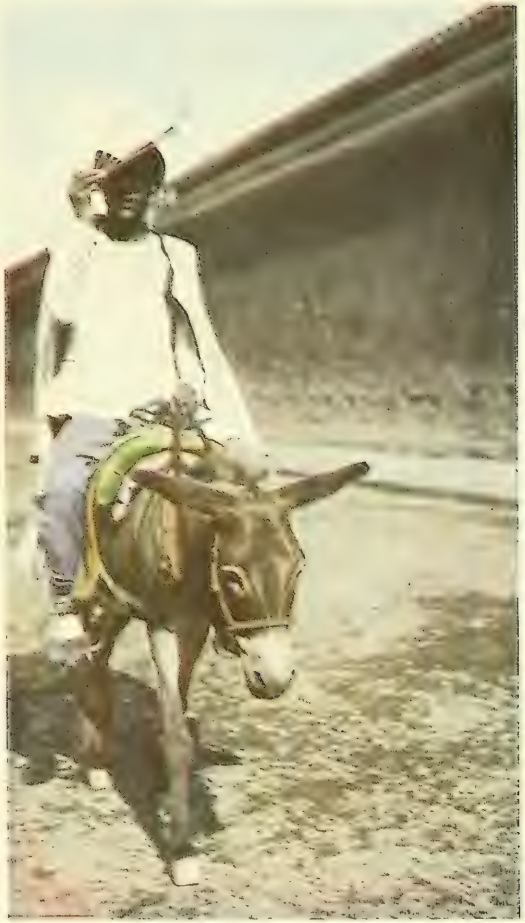
COMING TO TOWN, PEKING SUBURBS

OPEN PEKINGESE CART

ONE OF THE GREAT ENTRANCES TO THE CITY OF PEKING

THE TEMPLE OF THE MOON, PEKING

This is one of the collection of buildings comprising what is known as "The Temple of Heaven." They are said to be the finest specimens of Chinese architecture in existence. The triple circular terrace on which this



OUT FOR AN AIRING, PEKING

The frisky donkey is a very popular means of getting about in China. In the absence of a parasol, the shade afforded by a fan is very satisfactory.

A MANCHU CHILD

Although Manchu women in Peking fled at the sight of our kodak, the mother of this possible candidate for Emperor raised no objection when we endeavored to get his picture, providing, however, that her nurse girl should hold the child while she was safely screened within the compound enclosure.

MANCHU WOMEN, PEKING

By concealing the kodak until our victims had passed, we were successful in obtaining this picture, which we tender to those who decree the future styles of arranging the hair of American women as showing a form entirely different from any of their previous fashions.

RUSSIAN PEASANTS

These sturdy-looking men are a fair sample of the people who are settling Siberia along the line of the railway.

AWAITING THE ARRIVAL OF THE EXPRESS

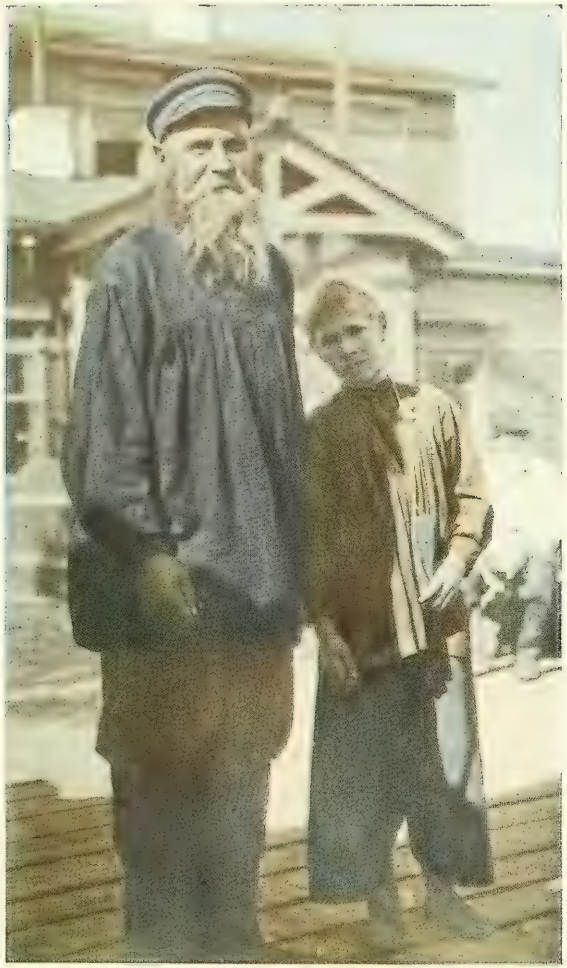
A group of the better class of Siberians at the station.

RUSSIAN EMIGRANTS TO SIBERIA

This family were lounging at one of the Siberian stations waiting for the train which was to convey them on to their new home.

SIBERIAN PEASANTS

The arrival of the "Train de luxe," the weekly express—at many of the stations on the Trans-Siberian Railway, proved an irresistible attraction to the peasants and farmer people, who, out of curiosity or to sell their simple dairy products, thronged the platforms.



SIBERIAN PEASANTS

Shirt waists were popular with both men and boys along the railway.

AN INTERESTING GROUP

The priests of the Russian Greek Church are, as a rule, a fine-looking body of men. They wear full beards and hair hanging below their shoulders, which makes them appear the Russian conception of Christ. The one in our picture was on the frontier and not as well groomed as they usually appear.

A RUSSIAN MERRY-GO-ROUNDER

Were this happy-go-lucky individual to fall into the hands of some vaudeville agency the fortunes of both would be insured.

A BASKET PEDDLER, TRANS-SIBERIAN RAILWAY

A RELIGIOUS BEGGAR, TRANS-SIBERIAN RAILWAY

With the sacred emblem on his breast.

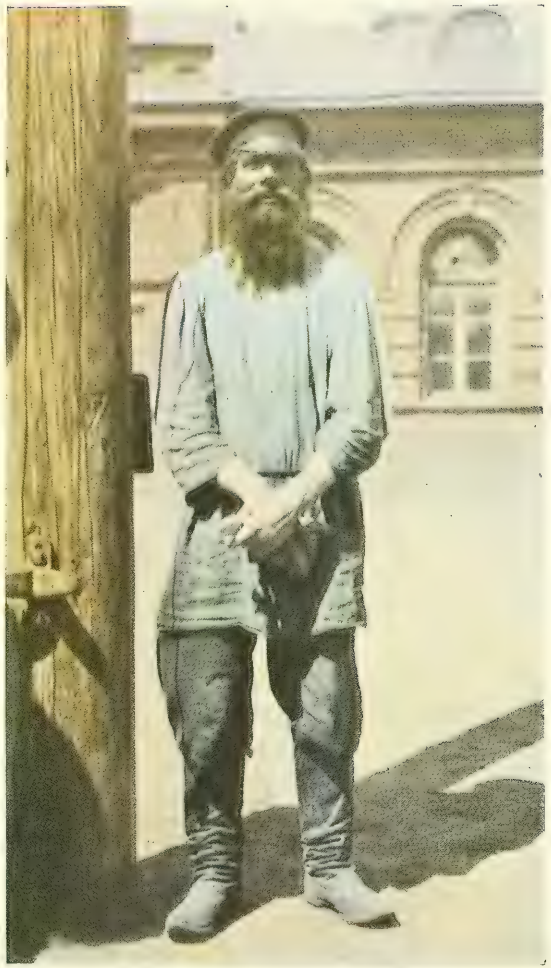
AN OLD SETTLER

The journey over the Trans-Siberian Railway is one full of excitement to the successful kodaker, for between the efforts of the people to avoid him, and the determination of the guards to follow and restrain him, he has to be pretty active.

ONE OF OUR FELLOW PASSENGERS ON THE TRANS-SIBERIAN RAILWAY

A SIBERIAN SETTLER

One of the poorer of the bearded peasants.



A TYPICAL SETTLER, SIBERIA

Full beards were quite the fashion along the Trans-Siberian.

SIBERIAN BEGGAR

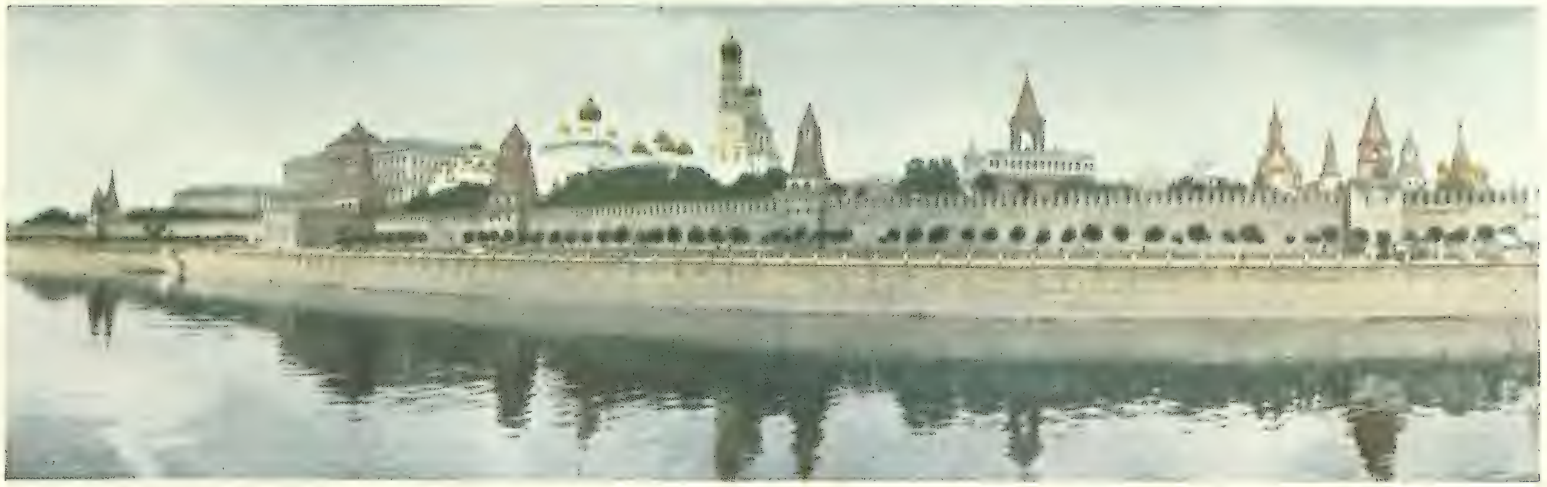
Professional beggars were quite numerous at the large towns.

THE ANIMATED SIGN BOARDS, MOSCOW

This picture is evidence of the enterprise of Russian merchants.

A WELL-EQUIPPED MENDICANT

This enterprising woman appeared to be supplied with enough paraphernalia for a week's camping trip. That her position near the entrance to three cathedrals was well chosen was proven by the frequent sounds of the kopecs as they struck the bottom of her extended tin coffee cup.



THE KREMLIN, MOSCOW

This acropolis of the ancient city is grandly located on a bluff overlooking the Moskva River.

THE KREMLIN, MOSCOW

A panoramic view of some of the old historical buildings within the Kremlin enclosure.

A CIRCASSIAN

These peculiarly dressed men from Southern Russia are occasionally seen in Moscow.

THE GREAT BELL, MOSCOW

This monster bronze bell was intended as an addition to the great chime in the Ivan Tower. The weight of the bell is 200 tons. Soon after it was cast, in 1735, a fire destroyed the building sheltering it, and cracked off a piece weighing nine tons.

THE CZAR OF CANNON, MOSCOW

Standing within the walled enclosure of the Kremlin is this mammoth gun, said to be the largest cannon ever cast, although it dates back to 1586. Though it contains about forty-three tons of metal, the only purpose it has ever served has been as an ornament.

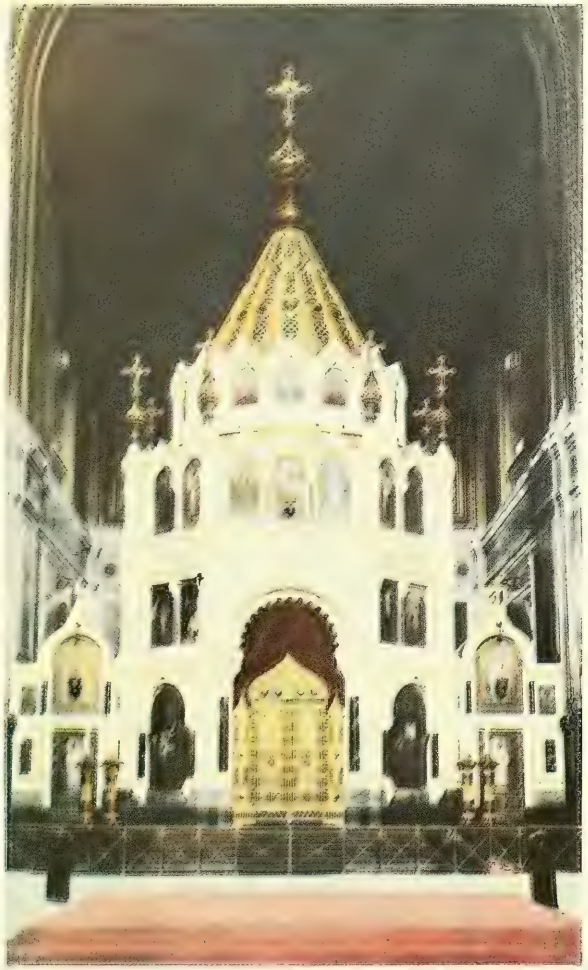
A RUSSIAN COACHMAN, MOSCOW

A coachman wearing this padded coat on July 12th appeared to us a decidedly warm proposition even for Moscow. As his price increases with his girth measurement, it is not surprising that the garment is worn the year round.

TIRED PILGRIMS, WITHIN THE KREMLIN ENCLOSURE

A FUNERAL IN MOSCOW

EMIGRANTS TO SIBERIA

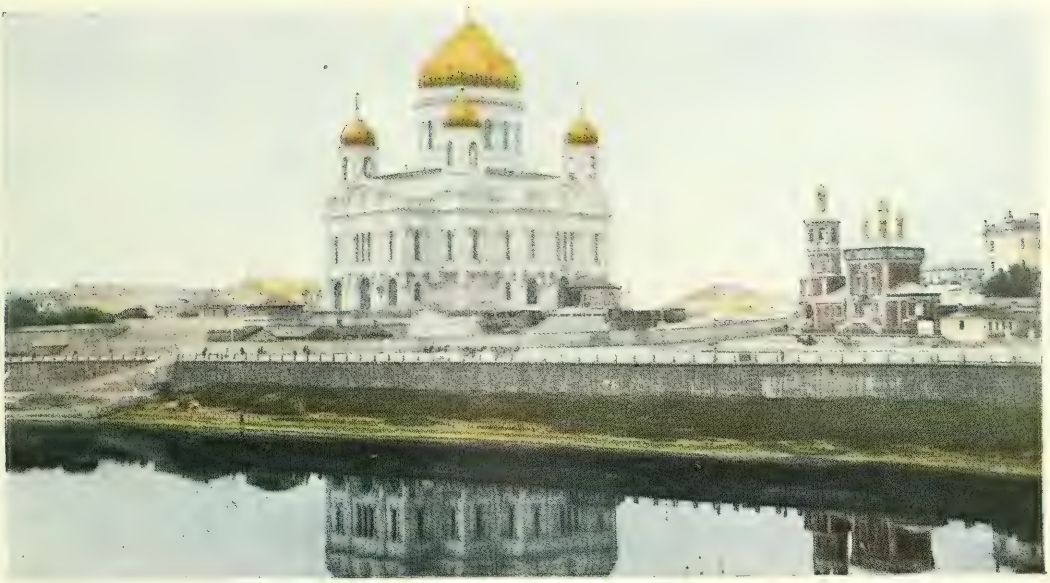


INTERIOR OF ST. SAVIOUR'S CATHEDRAL, MOSCOW

The white marble chancel of this magnificent cathedral is a marvel of beauty. The red platform is where the choir, composed entirely of men's voices, is located.

BEGGARS LINED UP AT THE ENTRANCE TO THE CLOISTER, MOSCOW

Inside the Kremlin, near the Redeemer Gate, stands a chapel connected with the Cloister, wherein lie the remains of all of the Empresses of Russia excepting those of Catherine the First. The vestibule of this chapel was lined on either side with beggars, with an overflow



ST. SAVIOUR'S CATHEDRAL, MOSCOW

While the cost of this church (said to have been about twelve million dollars) was less than that of St. Isaac's in St. Petersburg, its location on the highest part of Moscow, together with its style of architecture, combine to make it the more beautiful of the two.

CHILD'S FUNERAL, MOSCOW

This drosky bearing the casket containing the remains of a babe is about to enter the Kremlin through the "Reedemer Gate." The heads of the men are uncovered, for no man, from the Emperor to his lowest subject, would pass that gate without removing his hat.

SCENES AT THE RUSSIAN DERBY, MOSCOW

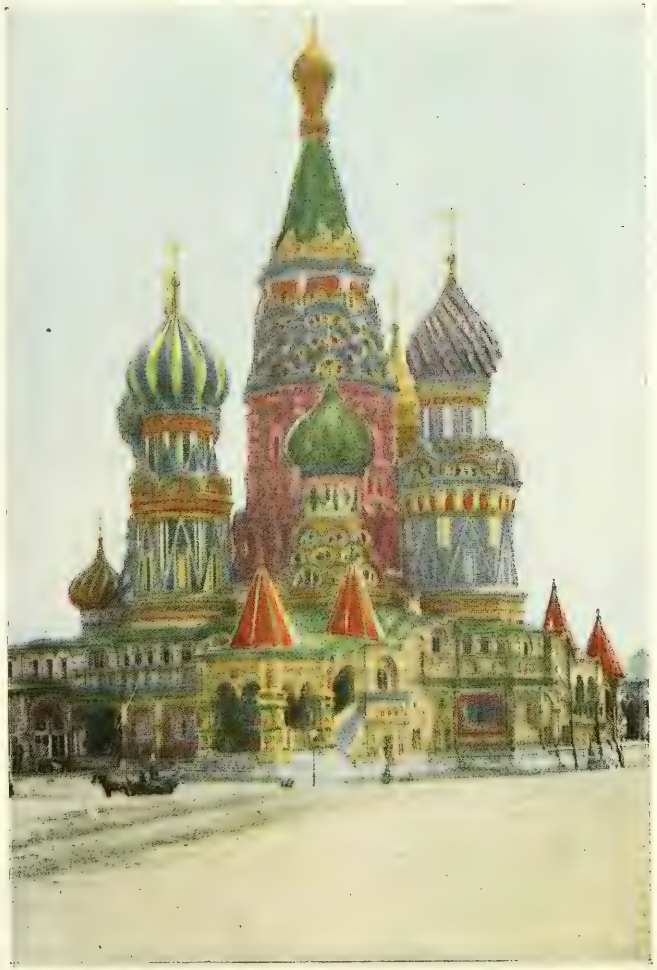
As the horses drew up the last quarter, people sitting at the refreshment tables in front of the grand stand stood on their chairs to enable them to look over the heads of those standing in front, and see the horses as they approached the wire.

ST. ISAAC'S CATHEDRAL, ST. PETERSBURG

It is said of this cathedral that "Into the construction of no other building known has such a lavish quantity of semi-precious stones entered." These include ten columns of malachite thirty feet high, several columns of lapis lazuli, great mosaic panels, and rails of pure alabaster.

A THREE-HORSE TEAM, MOSCOW

Teams of large handsome horses resplendent in brass-bestudded harness, the center animal in the shaft with the wooden arch (duga) over its neck and a prancing mate on either side, are peculiarly Russian and may frequently be seen in the large cities.



CATHEDRAL OF ST. BASIL, MOSCOW

John Ivan the Terrible erected this cathedral more than three hundred years ago over the remains of an imbecile monk. It stands in the shadow of the wall of the Kremlin and faces the Red Square, which for many years was the place of execution of the victims of this blood-thirsty monarch.

THE RESURRECTION OF CHRIST CATHEDRAL, ST. PETERSBURG

This dazzlingly decorated church, erected as a memorial to the martyred Emperor Alexander II., covers a block of the pavement on which he was assassinated in 1881 by means of a bomb.

and frequently the faithful horse is included in the family group. Enterprising women and children are busily engaged beside the track picking the little wild strawberries, and at the stations they are like swarms of bees offering the berries for sale at about ten cents per quart. The fruit is ripe and of a peculiarly delicious flavor.

At half past three, July 8, we arose, but even at that early hour the sun had preceded us, thus affording a good light at Samara to view the greatest of European rivers—the Volga, whose waters, before mingling with those of the Caspian Sea, 2,300 miles distant from its source, are navigable for 1,800 miles. At Samara the river is spanned by a substantial iron bridge almost a mile in length, and from our car window we view the waters as they flow 140 feet below.

THE CITY OF SPIRES: MOSCOW

The numerous cathedral spires of Moscow, with their copper domes, are as strikingly characteristic an indication of one's approach to the old Muscovite capital as the great stacks, with their accompanying clouds of smoke, presage the entrance to some of the American manufacturing cities.

We alighted from the train at the station in Moscow ten and one-half days from Peking, only eight minutes behind schedule time.

Our first efforts were directed to obtain permits to use the kodak, since the principal occupation of both the police and the soldiers of Russia seems to be to inspect passports and kodak licenses. In Moscow it was necessary to procure two licenses; one from the military and the other from the police authorities. The possession of these licenses saved us much annoyance and furnished considerable amusement. Many of the guardians of the law were unable to distinguish between them. In fact, any official-appearing paper would probably have been as satisfactory.

SAINT SAVIOUR'S CATHEDRAL

Of this great city of spires, Saint Saviour's Cathedral (see pages 1066-1067), which occupies the highest prominence in Moscow, is the most magnificent and striking church building. It rivals in splendor, if not in cost, any other sanctuary in the world. It commemorates the expulsion of the French from Russia, and was begun in 1813 and completed 18 years later. Around its four sides is a marble frieze of life-size figures. The beauty of the exterior conveys but a slight intimation of the wonders of its interior, which comprise quantities of semi-precious stones of Siberian jasper, green malachite, and alabaster, with many life-size pictures in mosaic, encrusted with jewels of fabulous value.

One single piece of Siberian jasper, in the form of a medallion, set in the marble wall, represents an outlay of $15,000; and the total cost of the structure is stated to be nearly $13,000,000.

Wishing to obtain a picture of this edifice, we directed our steps in that direction the morning of our second day in Moscow. We were fortunate in so doing, since on arriving there we found a great service being held in commemoration of the two hundredth anniversary of Peter the Great's victory at Plevna over Charles XII of Sweden.

The dimensions of the interior of Saint Saviour's seemed greater on account of their being no pews. We were impressed with the earnestness of the worshipers. During part of the service worshipers prostrated themselves until their heads touched the coarse mat of the covered floor. At our side was a poor woman in black who spent most of the time on her knees, devout but entirely undemonstrative. A short distance from her was another woman so affected that had not the tiles of the floor been well fastened she certainly would have removed them that she might in her prostration get her head to a lower level. On the opposite side was a strongly built, full-faced bearded man, with a noticeable rotundity of form, who, from the rapidity of his movements, acted as though his piety had for some cause been long deprived of the privilege of a public demonstration.

The chancel, constructed of white marble, is of especial beauty. On either side of it are seated antiphonal choirs, each containing, at the time we saw them, 28

men and boys, uniformed like Russian soldiers.

A MARVELOUS VOICE

There was no organ or musical instrument to accompany the voices, but the great arched dome, bare of drapery, acting as a sounding board, helped wonderfully to supply the omission. After the opening of the service, both choirs were massed on a platform directly in front of the chancel and about 40 feet back.

As we entered the auditorium the choir was chanting one of the canticles of the Greek church. Its peculiar melody was very tuneful and most effective as sung by the male chorus, while beneath all, in a different measure, but in perfect harmony, was a deep resonant voice, the vibrations of which resembled the rumbling of distant thunder. The obligato, occasionally heard in a short burst of tone, was in quality like the rich diapason of a great pipe organ.

Wonderful at all times, the priest singer was simply superb in his intonation of the succeeding prayers. Beginning about low "C," at the ending of the phrase he modulated one-half tone higher, and after a short, impressive pause started the next line in the new key. He sang each verse in a similar manner, throughout the octave gradually increasing the volume of tone, until the last verse was finished, when the refrain, taken up by combined chorus, culminated in a great flood of harmony.

The enormous temple, with its dazzling array of precious stones, decorations, and paintings, costing fabulous sums, sinks into utter insignificance in the recollection of that marvelous voice.

Its possessor was a long-haired, bearded priest, a man of large stature, combined with the finest musical sensibility, which enabled him to use his great organ in this most effective manner. His voice was beyond the power of description in its grandeur and richness of tone, still with no indication of its limitations having been reached.

The priesthood and choirs of the Greek church contain many remarkable voices, and, while no instruments are employed, music forms a prominent and attractive part of each service. Although for the most part the choirs are composed of male voices, there are some very fine organizations which include only female voices.

The chancel of Saint Saviour's Cathedral was so beautiful that a resolve was at once made to try for a picture, and a visit was made with the kodak later in the day for this purpose (see page 1066).

THE WONDERS OF THE KREMLIN

The Kremlin, like the Forbidden City in Peking, is inclosed by a wall entirely independent of that encircling the city. It marks the part which escaped the great conflagration when the outlying districts of Moscow were burned by the Russians, who were besieged by Napoleon. The present wall replaced one of oak—some 500 years ago—which, like the Great Wall of China, was erected as a defense from the Tartars (see page 1062).

Within this inclosure is located the Imperial Palace, the Treasury, the Arsenal, and three cathedrals, which for centuries have respectively been the places of the crowning, the marrying, and the burying of the Tsars of this great nation. The inclosure also contains a convent and many great monuments. On one side, far below, flows the River Moskva, from which the city takes its name. From the river's opposite bank the view of the splendor of this collection of buildings is unsurpassed.

Probably nowhere in the world does an inclosure of the dimensions of that described by the wall of the Kremlin contain precious stones approximating the value of those displayed here. It has been aptly stated that they should not be counted by thousands, but measured by the peck. To guard them 800 soldiers are constantly in and around these buildings.

The Ivan or Bell Tower is the most conspicuous structure in the inclosure and contains 36 bells, two of which are of silver, the largest of the collection weighing 65 tons (see page 1062).

This large bell seems to lose its magnitude when we come to examine the one resting on a stone foundation just

outside the tower, which weighs 200 tons (see page 1063). It was originally intended to hang within the walls, but soon after it was cast a fire destroyed the building which sheltered it, causing nine gaping cracks and the displacement of a piece of the bell weighing 9 tons. Owing to this misfortune, its tongue has ever remained mute.

Not far from the Bell Tower stands the arsenal, in front of which is a display of 850 bronze cannon, trophies captured from the Turks and French. Prominent among these is the "Great Gun," its mouth having a diameter of 3 feet, surrounded by so thin a shell that regard for safety probably accounts for the fact that it, like the Great Bell, has never spoken (see page 1064).

These two curios, coupled with Moscow's prevalent paving material, are spoken of as the three ancient wonders of the city. "The heaviest bell which never was rung, the largest cannon which never was fired, and the greatest amount of cobblestone pavement" (which ought to be fired).

THE CATHEDRAL OF SAINT BASIL

As we leave the Kremlin by the Redeemer's Gate, a few steps to the right bring us to the strikingly gorgeous Cathedral of Saint Basil, beside which the colors of the rainbow pale (see page 1070). More than 300 years ago, by command of "Ivan the Terrible," this peculiar building was erected over the grave of a popular prophet of the time, known as "Basil the Imbecile."

The old ruler is said to have asked his architect whether he could erect another cathedral as beautiful as this one. On the latter's replying that he could, his eyes were promptly put out to prevent such an act in case the architect should fall into the service of a subsequent ruler.

The exterior of this beautiful edifice is much the better part of it, for the interior is exceedingly disappointing. The eleven towers, each one differing from the others, cover tiny chapels of like diameter, and as we stood gazing up at the ceiling, in each of which is a great mosaic eye, the effect was like looking up from the bottom of a well.

Directly in front of the Saint Basil Cathedral lies that formerly dreaded space, so appropriately named the "Red Square." This is the spot where 200 years ago the most horrible forms of execution and public punishment were inflicted. At the right of this square a magnificent arcade, covering an entire block, has recently been erected, and is now occupied by hundreds of the best class of stores in Moscow.

THE "REDEEMER GATE"

To the tourist no country in the world shows more evidence outwardly, in the way of religious observance, of being a Christian nation than does Russia.

The sky-line of Moscow, as viewed from afar, looks like a forest of spires. Two thousand cathedral and temple spires point heavenward, their numerous peculiar-shaped domes resembling inverted onions, while their gilt roofs glisten in the sun's rays like great searchlights.

On reaching the city, you have no need to alight and enter the buildings you are passing to learn where the shrines are located. Simply observe the driver of your drosky for a short distance, and his almost continual crossing of himself and uncovering of his head will give you unmistakable evidence.

Then there is that old entrance to the Kremlin, built about the time Columbus discovered America—the "Holy" or "Redeemer Gate." Here, whatever one's belief or condition of life—be he Emperor or subject, Jew or Gentile—his head must be uncovered when passing as a mark of worship or reverence to the golden icon of the Saviour hung above the gate.

A short distance from the Kremlin one passes the double arched "Sunday Gate," and it will be the exception if any of the passing throng, however hurried, do not stop at the little chapel to worship the most celebrated miracle-working image in Moscow, the "Iberian Mother and Child." The building is so small that frequently devotees in a line reach-

ing for some distance along the street await an opportunity to enter. A net of real pearl envelopes the head of the mother and her person is adorned with many valuable jewels.

Here for centuries have the rich, the poor, the well, the sick, and all sorts and conditions of people paid their fervent homage. As a tender token of their devotion they have deposited a kiss upon the hands of both the mother and child until the pictures of the hands have disappeared, hidden by a dark thick crust of dried kisses. In their earnest piety the worshipers acted in full sympathy with the little verse:

"Though deadly germs in kisses hide,
E'en at the price the cost is small;
'Tis better to have kissed and died
Than never to have kissed at all."

The Greek Church of Russia is divided into many sects, and the Tsar is the acknowledged head of the main or orthodox body. The priests as seen by tourists appear a dignified splendid lot of men. They wear broad-brimmed hats and coats of dark brown, the skirts of which reach to the ankles, while a gilt cross hangs from a chain encircling the neck. With their full beards and hair hanging over their shoulders and reaching nearly to the waist, they closely resemble the Russian conception of Christ.

In one line of religious activity, viz., the spread of the gospel, the Russian government leads the world. Its railroads and steamboats make no charge for the transportation of the Bible to any part of the realm. Yet religious liberty counts for but little in that country.

THE GREAT DERBY RACES

Not only are horse-cars still a popular means of conveyance in Moscow, but there is a line of cars without tracks which appears to receive its full share of patronage, although the cobblestone pavement and the small wheels of the car must form a most uncomfortable combination.

The cabbies of the "four seaters" and some of the droskies present a warm proposition in the hot July days with coats padded to the thickness of pillows. This is another indication of caste, for the rule seems to be, the thicker the pads the more stylish the turnout (see page 1064).

Fortunately for us, the Great Derby races occurred during our stay in Moscow. During these annual races the hotels are thronged with Russians of the higher class, who make quite a display of their large diamonds and elegant gowns.

We were interested observers of their manner of greeting. The men kiss each other on the cheek, but only kiss "my lady's hand or wrist." This manner of salutation indicates that we have made some progress homeward, having left behind us Japan, where three bows made from the hips like a jack-knife answer the proprieties; and China, where a man shows his kindly sentiments by cordially shaking his own hand.

The cash stakes for the races amount to 38,000 roubles, about $19,000.00. The lines of conveyances hurrying to the track are miles in length and form a lively and brilliant procession. Some of these equipages seem royal in their appointments. Especially so are the handsome carriages drawn by three large horses, the center animal wearing the arch-shaped yoke (douga) over the collar, the substantial Russian harness, almost entirely covered with metal, being polished to the brilliancy of a mirror, and the horses going on a full run (see page 1069).

The horses are raced under the saddle over a turf track. It is interesting to note that a majority of the drivers are American jockeys.

In front of the grandstand refreshments are served on small tables, and as the horses swing around the last quarter those occupying seats at the tables mount their chairs to gain a sight of the finish, over the heads of those standing at the rail near the track, about ten feet distant.

A careful observer would have noticed a tallish man, apparently absorbed in the result of the race, take a position directly in front of one of those couples. At first glance one might think he was about to witness one of those mysterious tragedies so common in Russian history from the looks of the dark object which is poking its glassy eye at the couple, from under

the said tall man's arm. But if near enough, one will hear a slight click and perhaps notice a suppressed smile as the bold man with the kodak moves toward his next victims (see page 1068).

One of the conspicuous types of people attending the races is the Caucasian, wearing his peculiar garb.

The Irish sportsman's exclamation on his first sight of a dude, "Phat strange things one does see when he hasn't a gun," fairly expressed our sentiments at the first glimpse we had of the ladies, bearing on their heads the enormous inverted washtub hats at the Russian race track. We thought as we snapped the kodak on them that we had secured a view which at home would rank in point of interest with those of an ancient temple or an Indian war dance. Since our return home, however, these head coverings have become so commonly worn that for the time being our highly prized picture has lost the novelty, which will probably return to it as years roll by and civilization and reason obtain a stronger foothold. The rapid evolution of ladies' bonnets since our departure is well described in the little rhyme:

"Mary had a little hat,
Not bigger than a stopper;
Mary soon got rid of that;
Her present hat's a whopper."

"THE CITY AGAINST NATURE"

To visit Russia without seeing St. Petersburg, which has been so appropriately termed "The city against nature," would be cause for genuine regret.

Although nearly two centuries have passed since the active career of Peter I closed, the very atmosphere of St. Petersburg is still filled with reminders of his great achievements. It is impossible to comprehend the obstacles overcome by the builder of this massive city, situated as it is at the confluence of the great River Neva with the Gulf of Finland, almost within the Arctic circle and on a marsh half under water and scarcely above the level of the sea. The outlay for labor and capital to bring logs from the mainland and drive them into the mud one on top of another, forming the foundation on which to build, cost an amount sufficient in itself to complete a town of considerable size.

The building of the city of St. Petersburg under these conditions is alone a warrant for the title "Great," given to its indefatigable founder, had he not earned it by his skill and perseverance as a ruler, or been entitled to it on account of his physical proportions. While history acknowledges Peter the Great the creator of modern Russia, no other act of this wonderful man more forcibly illustrates his persevering energy than his wresting from the waters the site of this great city.

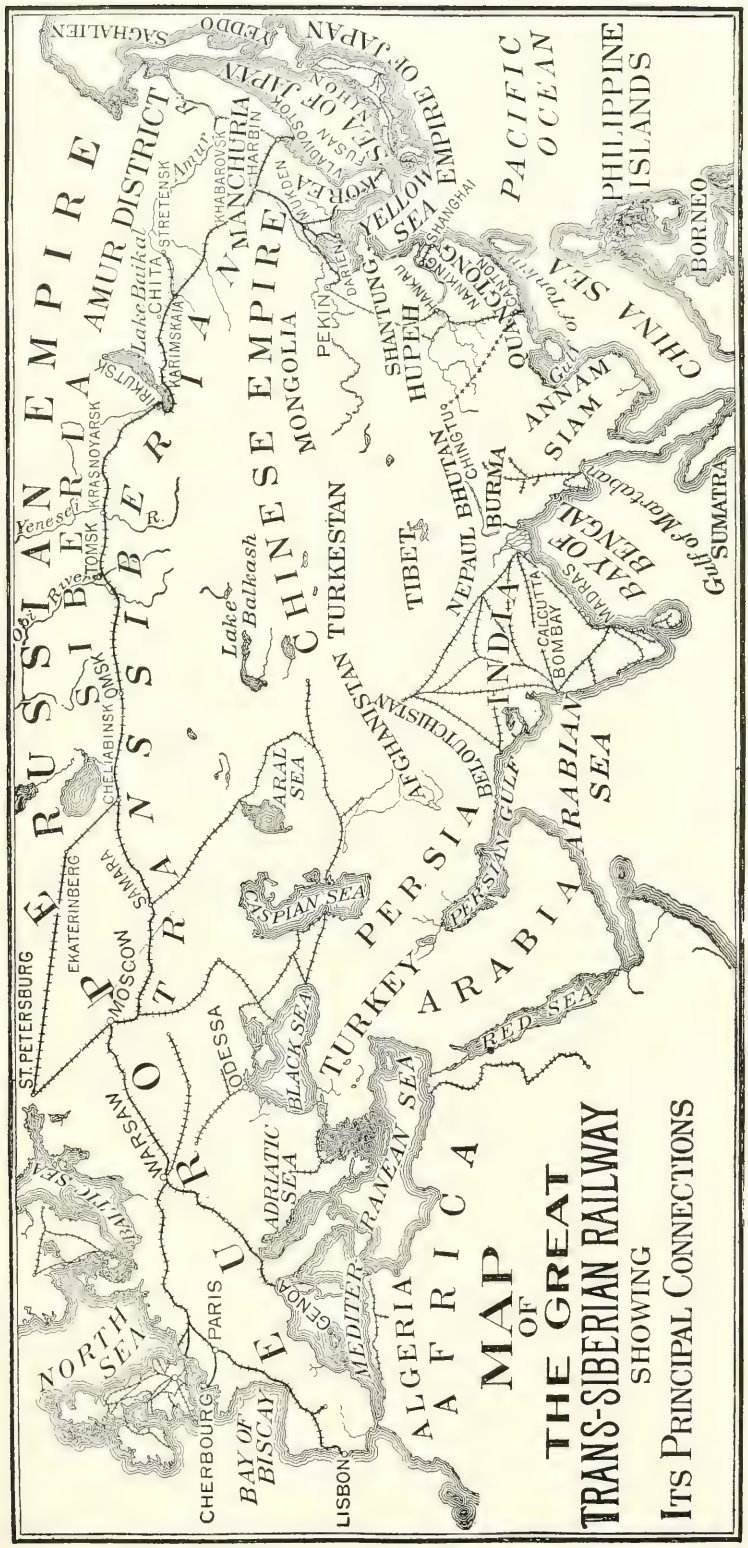
SAINT ISAAC'S CATHEDRAL

From either approach to this Imperial City the most noticeable object is the great gilt dome of Saint Isaac's Cathedral, which raises its spire 336 feet above the ground (see page 1069). Although not as distinctly Oriental as Saint Saviour's, of Moscow, it impresses one especially with the grandeur of its proportions. Every outline is indicative of simplicity as well as of permanence. Its massive walls, like the entire city, rest upon stilts.

The pile foundation of the Cathedral alone cost one million dollars, and the total cost of the edifice is estimated to have been over $16,000,000. About 56 years were required in its building. Its form is that of a Greek cross. It has at each of its four corners an enormous portico in imitation of the Pantheon at Rome, supported by single stone pillars 60 feet in height; 200 pounds of pure gold is said to have been used to gild its dome and cross.

Into the construction of no other building known to us has such a lavish quantity of semi-precious stones entered. These include a chancel rail of pure alabaster and ten columns 30 feet high of malachite, besides others of lapislazuli costing $30,000 each.

At the service which we attended the large auditorium was well filled, without any distinction being made as to class, the rich and the poor standing or prostrating themselves side by side. We, as visitors, were assigned seats on the raised platform inside the rail and next to one of the antiphonal choirs. In the same



relative position on the opposite side of the church were seated members of the royal family. Our location was most fortunate for observing the interesting service. The surroundings were magnificent in the extreme and the music very beautiful. But the voices of the priests, while superb, bore no comparison to the one heard at the anniversary service in Moscow.

At the far side of the park in front of St. Isaac's is the famous equestrian statue of Peter the Great, depicting the Emperor seated upon a rearing horse. The statue is mounted on an enormous boulder, as large as a medium-sized house. It is interesting to note that this great stone was brought from the shore of the Gulf of Finland, 8 miles distant. A road was built with iron tramways and a special bridge was thrown across the Neva and the boulder rolled along on cannon balls, hundreds of men and horses being required to bring it to its present position. At the first view one wonders how the casting is held in position; but on closer examination it is found that the horse is standing on an adder, which typifies the difficulties the great ruler overcame. This serpent spread on the rock is swept by the tail of the horse, and

the two combined with a counterbalance of 10,000 pounds of metal to adjust and maintain the proper center of gravity.

Near the principal business district of St. Petersburg stands the gorgeous "Church of the Resurrection of Christ" (see page 1070), which in outward decoration surpasses in brilliancy of colors the St. Basil Cathedral in Moscow. The edifice is thoroughly Russian in style, with fantastically shaped domes and minarets in most vivid hues.

This memorial cathedral incloses the stone pavement stained with the blood of the martyred Emperor Alexander II, who was assassinated on this spot by means of a bomb one Sunday in 1881 as he was returning from parade. It would seem after having liberated 23 millions of serfs from slavery Emperor Alexander II was deserving of a less cruel fate.

NOTES OF THE CITY

The population of St. Petersburg is nearly two million, and the people and costumes seen on the streets represent almost every nationality of Europe and Asia. A custom new to us is noticed in the parks, viz., the dresses of nurses, indicating by their color the sex of their charge—blue for a boy and red for a girl.

The Winter Palace, the chief Imperial residence, is a vast building. Its outlook on the river is beautiful to the ordinary observer; but as the view includes the Royal Mausoleum, it is questionable how great may be the pleasure the vista affords the Imperial head of the house, in view of the tendency to anarchistic methods which prevail in Russia. The opposite side of the palace faces the broad square, in the center of which is the Pillar of Alexander I, a monolith 25 feet square and 155 feet high.

The original palace building, which housed 6,000 persons, was destroyed by fire in the year 1837, and was replaced with the present costly structure two years later. The apartments and halls of the part we were permitted to inspect are indeed palatial in appointments and furnishings and are crowded with rare historical paintings and silver plate.

Imagination must fall far short of picturing the beauty and grandeur of the royal entertainments given in the magnificent ball-rooms of this palace during the long cold winters of this North country.

Directly across the River Neva and opposite the Winter Palace lies Petersburg Island, the oldest part of the city. Here stands the most conspicuous building of the river front, the Fortress Church of St. Peter and St. Paul, supporting its peculiar narrow spire, 302 feet in height.

The purposes for which this mass of stone, erected 210 years ago, has served are decidedly varied. It has been the burial place of all of the Tsars, with the exception of Peter II, since it was erected. It is a church, a mint, a museum of military trophies and relics of the great Peter, a political prison, the execution ground, and a fortress. The walls of the part devoted to the mausoleum are hung with hundreds of wreaths wrought in silver.

While this fortress church is all deeply interesting, one is glad to take his departure, since there is a decided gloom connected with the old surroundings, as though some of the sorrow and suffering to which these walls have been silent witnesses still permeated the place.

AN EPIDEMIC OF CHOLERA

Although during our visit in St. Petersburg the cholera had been claiming its victims in the city by hundreds, the only noticeable indications of its presence were some of the precautionary measures taken by the authorities. A sort of wheeled apparatus for furnishing boiled water in quantities, gratuitously given to the public, was located on the corners of the principal avenues.

To some of the Icons is attributed the power of working miracles and of healing the sick, and certain of them were supported under a canopy and carried in a procession of golden-robed priests through the principal streets, escorted by military and followed by numbers of the common people chanting hymns. As the procession proceeded, and until it had passed, the people on the roadside and walks prostrated themselves before the

sacred emblems as a petition to them to allay the epidemic.

Passing through the Tsar's domain, even at the rapid pace we have maintained, impressed us with the immensity of this colossal nation. Its 155 millions of population possess one-sixth of the land surface of the entire world, or three times the area of the United States, if we except our Alaskan bonanza, which Russia practically gave to Uncle Sam in 1867. Considering her almost limitless resources, her futre possibilities are incalculable; and certainly in her struggle for a higher civilization and the adjustment of the peculiar economic and political conditions with which she is confronted, her attitude toward America in the past commends her to our warmest friendship and support.

THE LAND OF PROMISE

By Major General A. W. Greely, U. S. Army

OUR journey across Siberia confirmed the opinion of the author, formed from previous geographical studies, that no other country approaches Russia in the extent of its territory, the diversity of its people, or in variety of climates; and, further, created the belief in its unsurpassable superiority as to the latent and fast-developing productivity of its agricultural, forest, and mineral resources.

VLADIVOSTOK

After an uncomfortable and somewhat tempestuous voyage across the Sea of Japan, at the end of May, our eyes viewed with refreshing delight the green and graceful hills that fringe the covered waterways on approaching Vladivostok. Soon, however, our thoughts turned from Nature's smiling aspect to matters of human interest as we approached the city, with its wonderful dry-dock, its green-domed churches, its railway terminals, and the outlying shipping, all glorified by the spring sun and smiling skies.

Before us was the stir of civil life and the bustle of commercial activity in the city proper, but from our decks we saw the smooth fields and gentle hill-slopes alive with the morning drills and operations of a Russian army corps. Apart from the rhythmic evolutions, novel to all and thrilling to a soldier's ear, were the melodious and stirring sounds of martial songs—anthems of loyalty to the Czar and devotion to country which are chanted by Russian soldiers on the march.

Although having many business buildings of the latest modern types, Vladivostok is plainly in the transitory stage attendant on its struggles to assume metropolitan importance. With a permanent population of about 50,000, its outlying military forces were estimated to be somewhat more numerous. There were apparent the usual concomitants of camp followers, ambulatory merchants, army contractors, and speculators.

Despite the inevitable reaction and commercial depression consequent on the end of a great war, Vladivostok will steadily grow in commercial importance, apart from its assured advantages through dry-docks, military depots, and railway facilities. Large areas of northeastern Manchuria and the whole of the great Amur Valley must always be tributary to Vladivostok. On the lower Amur there are already 50 or more villages of Russian pioneers, who are developing the agricultural possibilities besides exploiting the extensive fisheries. The vast timber resources of the Amur and of the maritime province are on the point of development. Their forested areas exceed half a million acres, which are gradually passing under foreign control, with the wise governmental policy of requiring the labor to be done by Russian workmen.

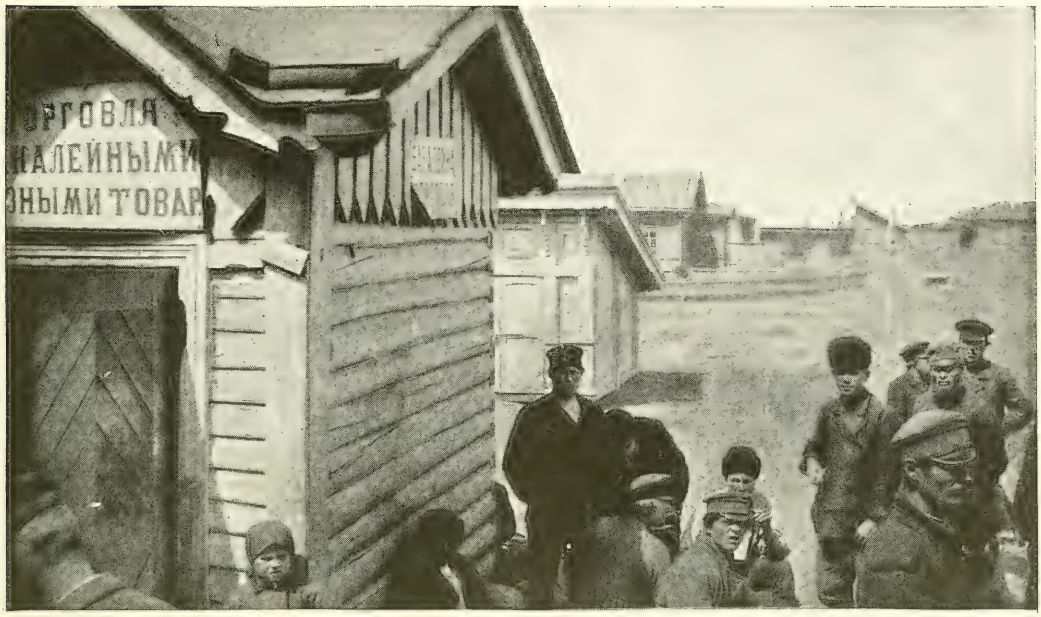


Photo by A. W. Greely

A CHARACTERISTIC SIBERIAN RAILWAY TOWN

Rude tarantasses and antiquated droskies in scanty numbers furnish the local transportation. The rude vehicles are dragged by Siberian ponies slowly and painfully through almost impassable streets, where the mud was axle-deep during our stay.

A RAILWAY WITHOUT A PARALLEL

The railway journey on which we entered is without a parallel elsewhere, extending across the entire Empire of Russia from east to west, the distance exceeding 6,400 miles from Vladivostok via Moscow and Warsaw to Alexandrov, on the frontier of Germany. This Russian railway system, covering 111 degrees of longitude, extends practically one-third of the way around the world near the 60th parallel of latitude.

While there are now various lines comprised in the Siberian system, the main stem, crossing northern Manchuria and passing around the southern shores of Lake Baikal, has its termini at Vladivostok, on the Pacific Ocean, and at Moscow—5,600 miles apart. Unique in its length, the railway was constructed with unparalleled rapidity. The strictly Siberian sections of 3,300 miles were built in seven years, 1891-1898, the rate of construction approaching two miles for each working day, from which are excluded Sundays and the numerous Russian feast days.

It is the recognition of conditions to say that the construction of this great transcontinental railway is one of the most remarkable feats of man's energy, persistency, and industry recorded in the annals of human history. There has been a tendency outside of Russia to underestimate this railway through irrelevant or unfair comparisons of the equipment and road-bed with those found on the standard systems of Europe and America.

The cost of the entire Siberian Railway systems has been variously stated, but it probably approximates $400,000,000—far exceeding the amount spent on any previous work of public utility, although it will be equaled or surpassed by the total cost of the Panama Interoceanic Canal.

The Siberian railways may be viewed as yet in conditions of transition as to rails, road-bed, and equipment. Originally of the lightest and least expensive character, not unsuited for the level, thinly settled country of western Siberia, they have of necessity been improved and modified so as to meet the growing

Photo by A. W. Greely

TYPICAL PIONEERS: YOUNG, VIGOROUS, AND AMBITIOUS

In the background are the women and children in the triple-decked emigrant cars

traffic, to suit the changing conditions of the mountainous country to the east, and especially to provide for the exigent demands involved in the transportation, feeding, clothing, equipment, and operations of armies of hundreds of thousands of men. This road is being gradually brought up to European standards. Much work was progressing in the direction of reduced grades, modified curves, improved alignment, and other betterments. Enlarged sidings and yards, improved freight facilities, and extended sections of double track are adding greatly to the transporting capacity of the road.

It may be added that in the year 1910 the railroad transported 1,869,183 passengers an average journey of 975 miles, and 7,508,675 tons of freight—military, private, and service. The rolling equipment is being increased, and beautiful, powerful locomotives of various types—wood, coal, and oil-burning, as economy demands—were in evidence. As will be shown later, the accommodations and facilities for passengers are excellent.

THE TRANSBAIKAL RAILWAYS

Excluding the main Manchurian stem (which across North Manchuria is organized and technically known as the Eastern Chinese Railway), there are three Russian branches to the Transiberian Railway. The original plan looked to a system entirely within Russian territory, and the perfection of this scheme caused two roads to be built—one of 178 miles, from Karimskaia to Strétensk, on the Chilka River, and the other of 337 miles, from Nikolsk, near Vladivostok, to Khabarovsk, on the Amur. Strétensk and Khabarovsk, it may be added, have intercommunication by river steamers during the navigable season somewhat irregularly, about once a week.

By far the most important branch is that toward China proper, which by a road 139 miles in length from Harbin connects with the South Manchurian Railway system, of which the center is Mukden, 190 miles farther to the south. From Mukden there is one Japanese road

of 258 miles to Dairen (formerly Dalny), Port Arthur, while another light Japanese military railway, now in course of reconstruction, extends from Mukden to Antung, there connecting with the Korean road to Seoul and Fusan. Especially interesting, however, is the Chinese extension, over which one travels comfortably 756 miles via Peking to Hankau whence via weekly steamers down the Yang-tse-kiang to Nanking and over another railway 196 miles in length, Shanghai is reached (see map, p. 1076).

EXCELLENT ACCOMMODATIONS

These railways have brought Peking within 14 days' travel of London, the fare, including sleeping car, being about $150 for second-class and $230 for first-class passengers.

The following information is of practical value regarding fares, distances, and time. The distance from Vladivostok to Moscow is 5,426 miles, which were traversed in 9 days and 21 hours. There are three through trains each week—an ordinary express, the state express, and the international train de luxe. On the last our journey was made. Except a transfer at Irkutsk, 3,425 miles east of Moscow, there is no change of cars.

The international is a steam-heated, electric-lighted, well-ventilated corridor train with an attached dining car. There are no ordinary passenger coaches, but there are first-class and second-class sleeping cars, divided into state-rooms for two and for four persons, the fare for each person being, respectively, 328.50 roubles (about $165) and 213.82 roubles (about $107).

Breakfast (bread and coffee, chocolate, or tea) cost 0.55, lunch 1.25, and dinner 1.50 roubles. The food is plain but well cooked, the service good, and the cars clean.

There is practically no difference between second and first-class accommodations except better upholstery and an indifferent toilet for the latter. Each compartment has leather-lined fittings (easily washed), a small table with a movable electric light, and very ample room for all baggage that can be needed in the ten days' journey. The free registered baggage is strictly limited and charges are high for extra weights.

While each compartment is private, there are no curtains to insure privacy of the separate berths. Other notable defects are scarcity of towels, lack of good drinking water, and the indifferent toilet conveniences, there being no separate provision for women. Bathing was possible in a section of the baggage car. The road being broad gauge and the speed low made night travel most comfortable.

East of Manchuria there are excellent buffets at the larger stations, and at every stop during daylight there were present venders of bread, butter, fruit, milk, chickens, etc., all of excellent quality and at moderate prices.

MANCHURIA IS RICH BEYOND CALCULATIONS

The slow-moving train and long stops enable one to form clear opinions as to the physical characteristics of Manchuria during the travel of 926 miles which bisects this great region. There can be but one conclusion—that its agricultural, mineral, and other possibilities are valuable beyond present computation. It resembles in appearance and approximates both in area and fertility that part of the United States which lies between the Mississippi River and the Rocky Mountains. Although in the main a level, disforested, and agricultural country, Manchuria presents in its northwestern section, in the valleys of the upper Sungari and Yalo rivers, not only valuable virgin forests, but also vast mineral deposits, of which the most valuable, coal, is already in process of utilization by the railway.

Whatever opinions may be held regarding the past policy and conduct of Russia as regards Manchuria, it is evident to any observant traveler that its railway construction and attendant developments have vastly benefited this Chinese province. Brigandage has been largely suppressed, life and property made more secure, local industries stimulated, and distant markets made accessible. With settled conditions since the war, the trade in agricultural products

was reaching tens of millions of dollars in value, and within ten years' time should aggregate annually hundreds of millions in amount.

Although a Russian block-house flanks every railway station, and its garrison doubtless rules with a rod of iron, yet the long-established Russian policy obtains and the racial susceptibilities of the Chinese are regarded to an extent that would be impossible for Americans to observe. In addition to other instances in evidence, there was noted the decorations of the small attractive railway stations at Iempo. The ornamentation was strictly Chinese, the graceful roof-trimmings being a series of the symbolated Chinese dragons pursuing their fleeing prey. All along the railway Manchurians of every grade and class were seen mixing with Russian civilians and soldiers, pursuing their various affairs with such freedom and assurance as would not be tolerated in most localities in the United States.

THE ALADDIN CITY

While Russian activities have thoroughly affected the peoples of northern Manchuria, yet they have centered in the Aladdin-like city of Harbin, which very lately was unpleasantly brought to the world's attention as the scene of the deplorable assassination of that great statesman, Prince Ito, of Japan.

The most populous of European cities in Asia, the former medical center of the Russian army—with a hospital so immense that 10,000 patients were cared for at one time—it seems an irony of fortune that Harbin should recently have lost thousands by pestilential plague. It is, however, a logical outcome of the governmental defects at Harbin. With unsanitary habits almost universal among its cosmopolitan population, there was, strangely enough in autocratic Russia, no dominant central authority over this collection of cities to enforce proper sanitary regulations, even if such were ever planned.

The existence of Harbin is due to the conjoined action of the Russian government and the Russo-Chinese Bank. The corporation obtained from China exclusive rights for 36 years to a region 100 miles square. Lavish expenditures, aggregating from 10 to 12 millions of dollars, built up a modern town near the point where the Transiberian Railway crosses the Sungari River over a fine steel bridge of modern type and standard construction.

With great and fluctuating business interests, Harbin has varied in population from 50,000 to 100,000 or more. It appeared to be a collection of heterogeneous communities rather than an administrative unit. There then existed nine practically independent administrations—the official, the army, the military hospital, the business, the manufacturing, the milling, the river, the Chinese quarter, and on the outskirts the original Manchurian village.

The milling facilities are adequate to care for more than one and a quarter millions of souls; the railway equipment is so extensive and well arranged that an army corps with its entire impedimenta can be entrained or detrained in a day.*

From observation and by report the Russians maintain a most conciliatory and tactful attitude towards the Chinese in general and Manchurians in particular. The enormous expenditures of the Russians yet continue at Harbin, whereby the Chinese—laborers, traders, and officials—have profited beyond their wildest expectations. As we tarried, there were in evidence a number of Chinese officers of the new army, smartly uniformed, alert in action, and prepossessing in appearance.

While many public and some private buildings are large and costly, there was that unmistakable cast of crudity to Harbin which causes it to somewhat resemble a thriving frontier city of America. The cosmopolitan character of the city was markedly emphasized by the incoming South China mail-train, which brought naked coolies and full-robed mandarins, the turbaned Hindu and the German

* Mr. Putnam Weale Simpson names nine flouring mills at Harbin with an output capacity of about 1,700,000 pounds daily, and nine others near that city which raise the capacity of Central Manchuria to more than 1,500 tons of flour daily.

Photo by E. B. Lobdell

PIONEERS AWAITING THEIR TRAIN: SIBERIA

The vast crowds of immigrants are rapidly transforming Siberia into a land of wealth and prosperity (see page 1085)

merchant, the silent Korean and complacent Japanese, the somber English official and the active American tourist.

A 4-berthed compartment of our Siberian train received as occupants a Japanese, a German, an Italian, and an Australasian, no two of whom could speak the same language. The Mukden route is fast gaining favor, as from Harbin one reaches Peking in two days at an expense of $29, first-class.

OUT OF MANCHURIA

After crossing the Nonni River near Tsitsihar, the prairie soon gives place to a hilly ascending country, where from time to time there were interesting glimpses of weird Bouriat camps. Occasionally parties were seen on the march, all mounted, as the women are expert riders. Novel in costume and pastoral in tastes, they yield slowly to Occidental civilization.

The country becomes more rugged and the route more circuitous as we ascend the eastern flanks of the Great Khingan range, where the summit is pierced by a tunnel two miles in length at an altitude of about 3,500 feet. Dense forests, wild torrents, narrow valleys, and sharply uprising ridges are the salient features of the western slopes, welcome changes from the treeless plains of central Manchuria.

Between the greater and less ranges of Khingan the railway crosses a corner of the eastern Gobi Desert, which there resembles closely the so-called desert of our Rocky Mountain regions, with more or less vegetation and an occasional shrub or stunted tree. With the view vanished childish illusions wherein the Gobi Desert was pictured as the dreariest and most desolate region of the world.

The prolonged stay at Manchuria, the customs station on the Russo-Chinese frontier, was not without interest. The accustomed tediousness of such examination was reduced to the minimum by the marked courtesy of the inspectors.

There were hundreds of small bales of *caravan-tea* awaiting shipment by rail

Photo by E. B. Lobdell

OMSK AND ITS TRAIN OFFICIALS: NEVER IN HASTE

to European Russia. This tea trade has been pursued for centuries, the trains of tea-loaded camels winding their slow way over the rough trails which lead hither from the remote tea-farms of inland China. Formerly they traveled westward to Irkutsk and Omsk, but now the railway displaces still further the camel, who gave way in part to the Suez Canal years ago.

THE TRANSBAIKAL REGION

The Transbaikal, a country of great forests with extensive areas of arable land interspersed here and there, charmed all by the quiet beauty of its varied landscapes and its attractive aspects. Although called a mountainous country in comparison with the low plains of western Siberia, where the highest elevation does not exceed 400 feet, the Transbaikal is really a region of moderate hills, like our own Catskills, the highest point on the railway being but 3,100 feet.

The mountainous regions of Manchuria are practically uninhabited, save by wandering hunters and pastoral people, so that the presence of permanent settlements and signs of human activities were welcome signs in the Transbaikal scenery.

In the watershed of the upper Amur, especially in the Ingoda Valley, and within sight of the railway, were lumber camps along and timber rafts on the river, pioneer huts in the forest clearings, small herds of cattle, newly broken land, and quickly growing grain, which marked the western limits of that vast immigration that is rapidly transforming uninhabited Siberia into a land of wealth and prosperity. The cloudless sky, pure air, countless flowers, lofty trees, and luxuriant vegetation set off to great advantage the new country that is passing under the domination of Russian colonists.

Crossing the Ingoda, the thriving town of Karimskaia was reached, whence a branch railway of 177 miles extends to

Stretensk, which is the inland center of the navigable waterways of nearly 2,000 miles in the watershed of the Amur.

To the westward the way is pleasant and picturesque across the low Yablonoi Mountains, with their many striking bits of landscape, especially while descending their wooded slopes, which led through the beautiful Selenga Valley to the precipitous shores of the wondrous inland sea, Lake Baikal.

LAKE BAIKAL

For nearly 150 miles the railway skirts the southern shores of this great lake. It is one of the lacustral wonders of the world, with its depth of 5,000 feet, its average width of 40 miles, its length of 375 miles, and its great distance—nearly 3,000 miles—from the ocean. Frozen over between four and five months each year, there were at the end of May large drifting ice-fields within view as the train passed. The warm, balmy airs, lovely scented flowers, the tuneful chorus of singing birds, a luxuriant undergrowth, and the spring dress of the huge forest trees—all gained in sweet contrasting attractiveness from the drifting ice-floes, the occasional snowdrifts in sheltered spots, and the white-topped peaks of Chamanka and other mountains.

Now the way stations had their quota of gazing but never-rude Russian colonists, and with them came shy peasant girls in quaint costumes and bright, becoming colors, whose welcome wares of wild flowers, sweet cream, soft cheeses, etc., were daily proffered and purchased from Transbaikalia to the Ural Mountains.

IRKUTSK

Much is not expected from a subordinate city, some 3,500 miles distant from the formal center of all Russian power—Saint Petersburg—especially when such city has been cursed throughout its history as a selected destination for political and criminal exiles.

Every traveler is therefore surprised to find Irkutsk a well-built, prosperous, modern city, with a population of about 75,000. Among Siberian cities, Irkutsk is noted for its churches, orphanages, hospitals, schools, observatories, and museums. It is a city of imposing buildings, beautiful homes, and is given to lavish hospitality, while its extended business operations are supplemented by all modern municipal equipments, including telephony and an efficient fire service.

It must be added that it has in summer nearly impassable streets, that the prevalence of unpunished crimes is notorious, while it is said by free-speaking Russians that the inefficiency of its police is only surpassed by the corruption of its officials. With a steady inflow of honest immigrants, conditions are believed to be slowly improving and the future is more promising.

The capital of a province of nearly a million people, Irkutsk on the Angara is admirably located to control a very large and lucrative trade. Lake Baikal, with its five contributory rivers, affords unusual transportation facilities inland, while the Angara, the discharging stream of Lake Baikal, leads to the Yenisei, with its 10,000 miles of navigable waterway. The government assay office at Irkutsk handles the gold produced in the province, which averages annually $10,000,000 in value.

SIBERIAN IMMIGRATION

The real creative force of a country's material prosperity, and the most essential element of its grandeur, is its population. Far-seeing statesmen have realized that within the twentieth century Siberia will be the center of Russian trade and commerce. In consequence a prominent feature of the empire's domestic policy has been the economic evolution of Siberia. In former years hundreds of millions of dollars were spent to maintain Russia's prestige and power in the Orient through military establishments and strategic lines of railways, but to scant avail.*

Now a wiser policy is appropriating millions of dollars annually for a peaceful invasion of Asia. In a single year more than $5,000,000 was spent to promote emigration from European Russia to Siberia, which is systematically and

* In ten years, 1898-1907, Russia spent $994,500,000 on railways.

successfully promoted. Emigration agencies have been established, traveling agents employed, surveyors utilized, and occasionally allotments have been made for travel expenses. Along the Siberian Railway there have been established suitable stations where immigrants are cared for through barracks, kitchens, and hospitals.

Schools and churches have been provided for the newcomers, who are also helped over the first year by grants of seeds, loans of stock and machinery, and other practical methods. Timber, pasture, and arable lands are allotted to newcomers, which may be either rented or bought on very favorable terms. Instruction is given along practical lines, and valuable, up-to-date machinery has been bought in large quantities for rent or sale to actual settlers.

In the Transbaikal region there were incoming pioneers, as they termed the immigrants, by the score, and in Irkutsk province by the hundreds. It was only in the region of Omsk that the travel was in full tide, with from 2,000 to 4,000 arrivals each day. Travel was in fourth-class cars at an expense of a quarter of a cent a mile. The cars were fitted up with berths, three-tiered, the lower changeable at will into seats.

Here could be seen an arriving train, from which ran at top speed the men on their way to obtain hot water for tea, which is provided free at each station, and later to buy bread at the emigrants' market. The women and children await in the train the arrival of bread and water for their frugal meals.

Again, at an important station would be seen several hundred pioneers, huddled in family groups on the main platform or in sheltered places. Surrounded by large bundles which contained their worldly goods, they slept or ate, awaited their turn in barracks, or looked forward to the arrival of the train that carried them to the Orient.

Official statistics show that in 1908 there were 785,712 *khodoki,* or pioneers, who entered Siberia, and that 121,204 returned to European Russia, making a net gain for Siberia of 637,608 settlers—a marked increase over 1907, when the net gain approximated 550,000. It is said that a bad harvest in Europe would swell the annual figures to a million or more.

From observation of pioneers en route (of whom about 7,000 were personally seen) and of actual settlers, it seemed certain that Siberia is receiving a hardy, courageous, and resourceful immigration. In physique and deportment they appeared to be superior to the peasantry between the Urals and Moscow. Naturally the provinces nearer to Europe profit most largely, and the destination of incoming pioneers is not far from 50 per cent between the Urals and Omsk, 30 per cent to Tomsk province, 15 per cent to Irkutsk province, and 5 per cent to Transbaikalia.

THE YENISEI VALLEY

Descending the Angara Valley, the road passes through the pastoral country of the Russian Bouriats, offshoots of the tribes seen in China, and cross to the watershed of the Yenisei. Incoming pioneers are rapidly settling this region, already beautiful with extensive fields of grain, for which the soil is especially suited. Crossing the Yenisei by a fine steel bridge, half a mile long, brought the train to Krasnoyarsk, the capital of the province, the thriving business center of the fertile upper valley (map, p. 1076).

The Yenisei watershed, in area more than one-quarter the size of all Europe, is destined to be one of the great grain-growing centers of the world. The grain grown in these and other regions in easy water communication already aggregates three or more millions of tons annually, which can be readily increased to five million tons. There exists uncertain and irregular water communication with Europe, which can be so improved as to furnish cheap transportation and assure wonderful prosperity to these inland regions.

THE TAIGA, OR VIRGIN-FOREST COUNTRY

The train soon enters the Taiga, an immense region of dense forests, largely of the well-known Russian birch and Siberian cedar. Here appears one of the strange vagaries connected with the en-

Photo by A. W. Greely

SIBERIAN IMMIGRANTS IN REAR OF OMSK STATION

About one-half million immigrants are pouring into Siberia each year

gineering of the Siberian Railway, which left to the north Tomsk, the capital of Siberia, now reached by a branch line of 46 miles. Time failed in which to visit this city, the center of the well-known mining district of the Altai, to the south, and of the vast and unique hunting grounds to the north, from which come the renowned Russian furs, the martin, ermine, otter, etc. Tomsk province bids fair to be in the near future one of the leading gold-producing centers of the world, as the gold mines of the Altai are now supplemented by extensive and wide-spread placer deposits in the forest regions.

As we passed there were seen thousands of pioneers who had come to Tomsk province to seek their fortunes. Some were joining the bands of trappers, but most were augmenting the hordes of gold-seekers who are fast invading this region.

THE SIBERIAN STEPPES

To the west the gloomy Taiga gradually fades away, and one comes into the bright, open steppes or great Siberian plains, which strikingly resemble the prairies of Illinois, Iowa, Kansas, and Nebraska. Extending 1,000 miles north and south, and as far from east to west, the vast watershed of the Obi (nine-tenths the area of the Mississippi and Missouri combined watersheds), despite its long winters in the north, is unsurpassed in its suitableness for stock-raising, dairy farming, and other agricultural pursuits. Its level and well-watered plains, dotted here and there by light growths of birch, alder, willow, and Siberian cedar, are covered by vigorous growth of nutritious grasses. The soil is fertile, stock of all kinds thrives, transportation facilities are good, coal is abundant, modern agricultural methods largely obtain, markets are accessible, and the population is rapidly increasing.

THE MOST IMPORTANT CITY OF SIBERIA

The capital, Omsk, on the Irtish, a tributary of the Obi, is now the largest (about 100,000) and commercially the most important city in Siberia. Here centers the river transportation of western Siberia, an interior system elsewhere

Photo by E. B. Lobdell

CHELIABINSK, IN THE URAL REGION: THE FAMOUS DISTRIBUTING CENTER OF THE IMMIGRANTS

unsurpassed in extent, which, through a large canal connecting tributaries of the Obi and Yenisei, aggregate about 15,000 miles of navigable waterways open six months in the year. In the Obi fleet alone there are 242 steamers and numberless other crafts. As the area of the watershed of the Obi alone is more than double that of Denmark, France, Germany, and Italy combined, the future importance of the fertile region may be vaguely estimated.

The great Omsk station was the scene of business activity and of railway travel such as characterize the large railway stations in America. The force of uniformed, self-important railway officials, led by the gorgeous station-master, were full of fuss and fury between the important train-de-luxe, the hordes of immigrants—arriving, encamping, departing—and the groaning, shunting freight trains which were disentangling themselves in the spacious train yards.

Immigrants by the hundreds swarmed over and around the station—men and women in the flush and vigor of life, gay and careless youth, the aged bordering on the verge of the grave, and the tiny babe at its mother's breast. Their humble belongings were in bundles and portable packages, among which spinning-wheels, cooking utensils, and the indispensable samovar were most evident. There was nothing disconsolate in act or face, but all looked forward hopefully to the promised land. Their quiet, orderly deportment was quite impressive; no quarreling or bickering, no drunkenness or dissipation was to be seen.

Here was a picturesque Tartar, there a little Russian; here an assertive Cossack, there a determined Khirgis chief. The national sombreness of dress was generally relieved by a bit of gay color: most pioneers were equipped with the Russian high boots, and their outer garments were of sheepskin, long since past its pristine whiteness.

THE SIBERIAN IS STOLID AND SILENT

As a rule—natives and pioneers—the Siberian is stolid and silent, but he was found to be kindly, interested, and invariably courteous. The contented and satisfied appearance of the peasant was generally remarked. They were well fed, well clothed—though the outer garments were often dirty—of very decent appearance, and had a self-respecting

manner far from groveling or sycophantic.

They appear more manly and energetic than the European peasants, and doubtless are so. It takes energy and determination to break loose from the environment of a lifetime, and to build a new home thousands of miles away under unknown conditions—this even with a paternal government to aid.

From Omsk westward to the Ural Mountains, about 800 miles, extends the Baraba country, the great producing region for foreign markets. In two provinces from Omsk west there are estimated to be about 12 million head of stock, one-half sheep, one-quarter cattle, and one-quarter horses, with nearly a quarter of a million camels.

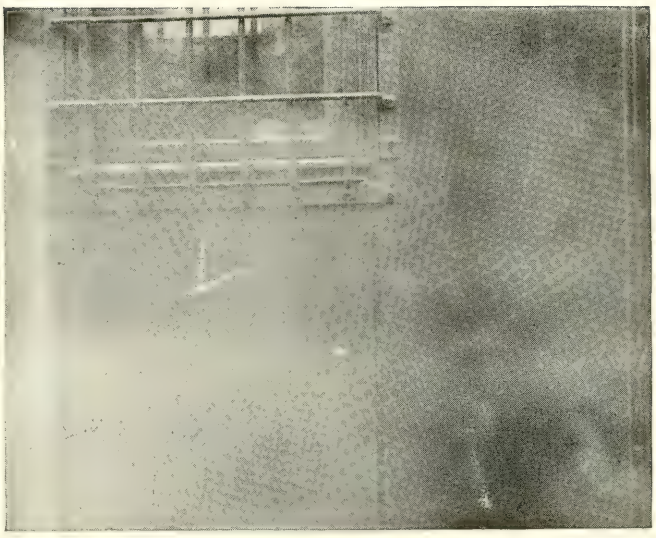


Photo by A. W. Greely

PRISON CAR AND EXILES ON THE SIBERIAN RAILWAY

65,000 TONS OF BUTTER ARE SHIPPED EACH YEAR TO EUROPE

The country is one of quiet beauty, luxuriant in vegetation, interspersed with groves of birches, willows, and alders, its soil evidently of great fertility and apparently equally divided between stock-raising, grain-growing, and dairy farming. Here and there were visible the rounded tents of the Khirgis, but in general the region along the railway has been taken up by pioneers, whose new huts and cultivated fields are much in evidence.

There was a constant succession of attractive sights: Bands of dromedaries, troops of ponies, stretches of purple heather, herds of cattle, scattered Khirgis tents, groves of white birches, fields of grain, files of carts, and miles upon miles of fragrant white lilacs.

The shipments to foreign markets from the Baraba region consist almost entirely of meat and butter. While the greater portion of the meat goes to St. Petersburg and other cities of European Russia, yet large and increasing shipments are made to Germany and England.

The most wonderfully developed industry in west Siberia is dairy farming. The latest methods and most improved machinery are used in the production of butter. The shipments to foreign markets are increasing year by year. More than 65,000 tons of butter are shipped to Europe annually. The butter is of the finest quality and commands the highest prices in England and in Germany, where the demand is steadily increasing.

Cheliabinsk, at the eastern foot of the Ural Mountains, is the point at which the western section of the Siberian Railway bifurcates, the newer road running to St. Petersburg via Ekaterinburg and Perm, while the older main line, crossing the Urals, continues via Samara to Moscow.

Cheliabinsk is the point from which were distributed in former years the exiles to Siberia. In these later days it has been made a resting place for immigrants, of whom it is estimated that about 3,000,000 have passed through the city. There are barracks, hospitals, laundries, baths, and summer camps, where everything essential for the health and necessities of the immigrant are provided. Twenty-five hundred can be comfortably cared for in winter and thirty-five hundred in summer.

Crossing the low-crested Urals at 1,800 feet elevation, the plains of the Volga were found unattractive as compared with Siberia, while the peasants

seemed inferior, in appearance at least. Although the city of Toula exhibits Russia in its new rôle of industrial establishments, all were glad when, practically on schedule time, the Transiberian train rolled into the great Koursk depot of the holy and busy city of Moscow.

Of unique and absorbing interest was "little mother" Moscow, with its praying pilgrims, countless icon-decked chapels, with its multi-colored houses and holy sanctuaries, culminating in the church-crowned walls of historic Kremlin, with their glittering cupolas and towers brightly beautiful in green and gold; but, however, they were symbols of a vanishing past.

One's thoughts turned from these sensuous attractions to the things of the present and near future, exemplified by the vast empire just crossed; for Siberia, somewhat relieved from the deadening bonds of autocratic officialdom, is teaching individual resourcefulness and independence through its vast plains, dense forests, lofty mountains, and great rivers. Slowly but surely the fuller, freer life of Asiatic Russia is bringing into higher and harmonious relations with its environment the godlike soul of man.

THE ALBANIANS

By Theron J. Damon, of Constantinople

NEITHER the bastinado, nor the gun, nor the cannon, nor exile, nor imprisonment, nor even death itself, will ever move them."

The speaker was a young Albanian who had received part of his education in the United States. He is now back in his own country, where he is working with indefatigable zeal for his people. He is one of the few educated men of Albania, but he intends that the coming generation shall not number educated men and women by the "few."

The words quoted above were preceded by these: "At present, from north to south, and from east to west of Albania, all classes of people—Moslem and Christian alike—have a desire, which amounts to a passion, for national education. All of them understand that just as in the past the *sword* was the symbol of power, so today *education* is the goddess of power, and they are going to possess education in spite of persecution."

The Albanians have come to a consciousness of their need of civilization and *western* progress. From the first day of the new Ottoman constitution the Young Turks, however, were determined that civilization should come to the Albanians only after being passed through a Turkish and Mohammedan strainer. This program could not be accepted by the Albanians, even had the Young Turks been capable of properly carrying it out.

The Albanian is a European; two thousand years and more he has lived where he now lives—in the fastnesses of Epirus and Illyria, across the Adriatic from Italy's heel. Early in the nineteenth century the Albanians mingled with their southern neighbors, the Greeks, and were the backbone of the struggle for Greek independence. The kinsmen of Marco Bozzaris, the Albanian hero of Greek independence, all migrated to Cephalonia, off the coast of Greece, but about two million less fortunate Albanians are yet under Turkish rule.

During the 125 years previous to the discovery of America, the proud republic of Venice held a benevolent supremacy over the Albanian coast towns and their spheres, and thus for a century retarded the day of Turkish domination. With the fall of Scutari-in-Albania and the expulsion of the Venetians by the Turks in 1478, the Turks began their overlordship—four centuries of chicanery, broken faith, and cruelty. The sum of the Turkish rule has been to put the Albanian only more deeply in debt to poverty, superstition, and bloodthirstiness than his mountain history and primitive traits would warrant. Throughout two

Photo by Theron J. Damon

ON LAKE SCUTARI, ALBANIA

Photo by Theron J. Damon

TWO ALBANIAN CHIEFS ON MONTENEGRIN SOIL, DISCUSSING WAYS AND MEANS WITH A REVOLUTIONARY LEADER

Photo by Theron J. Damon

AN ANCIENT BRIDGE NEAR THE TOWN OF SCUTARI, ALBANIA

millenniums the waves and impulses of progress have not reached him, or have passed by, leaving him untouched.

THE VENDETTA IS STILL PRACTICED

Today, as in the past, it is true that one in five of the male mountaineers falls a sacrifice to the terrible vendetta, which only civilization can eradicate from Albanian national life. To strike a person, even inadvertently, is a matter for blood revenge. Nothing else can repair the wounded honor. If the offender himself is not killed, one of his relatives must be the victim, and thus the endless chain is begun. When the vendetta has gone ridiculously far, it may be bought off, if there is sufficient money at hand, or "called off" through some of the intricacies of the Albanian code.

Let no one speak of the Albanian as lawless. He lives most scrupulously up to all that he knows; but that is the law given him by the customs and nature of his ancestors centuries ago, somewhat "codified" in the fifteenth century, though never to this day written down. Among the curious rules that govern his life are such as these: Persons descended from a common male ancestor, through the male line, consider one another as brothers, or brother and sister, and thus all marriage within a tribe is excluded. Young men may likewise swear brotherhood, and this forms a tie which subjects the men and their offspring for generations to the same marriage laws that blood relationship would involve.

Persons related through the same godfather cannot marry, and of godfathers there are two kinds, that of baptism and that of hair. When a child, boy or girl, is about two years old, its hair, never before having been touched by scissors, is cut with much ceremony. The godfather performs the cutting, leaving, if the child be a Christian, one lock for each of the four points of the compass, forming a cross; if a Moslem, three locks to form a triangle. In the case of a vendetta a man may not be harmed if in the company of a child or a woman.

Photo by Theron J. Damon

STREET SCENE IN THE TOWN OF SCUTARI, ALBANIA

AN INDOMITABLE PERSONALITY

Today the Albanian is the most picturesque personality in Europe; yet, interesting as are his traits, of more significant interest is his political future. An Albanian national consciousness has recently appeared and refuses to be crushed. Under the anomalous government of the Turk the various Christian races of the Empire, as the Ottoman Armenians, the Ottoman Bulgarians, and the Ottoman Greeks, have each their national existence, a state within a state, though subject always to the will of the Turk. The Albanians, although in the main they have adopted a kind of Moslem loyalty which gives them a quasi-solidarity with the Turk, are determined that they also shall have a national entity.

Though they are cursed with the backwardness which has everywhere accompanied in a greater or less degree the Mohammedan faith, their leaders realize that they are not an Oriental but an Occidental race; that their Turco-Mohammedan traits are a veneer, and that with but a generation of good education they will leap forward and take their place among the civilized and law-abiding races of the Balkan peninsula.

Not incompatible with the new Albanian nationalism—indeed, the reason for it—is the fact that the Albanian is one of the most intensely individualistic members of the human race. Were this not so he would ages ago have lost his identity in that of the various peoples who throughout the historical era have surged around the Albanian Mountains. In spite of the successive onslaughts of Roman, Goth, Serb, and Bulgar, and of the 350 years of Turkish domination, the Albanian has conserved his indomitable individuality. Crispi, the Italian statesman, was a thorough-going Albanian. He was a member of the large colony of Albanians in Sicily and southern Italy,

Photo by Theron J. Damon

CHRISTIANS OF SCUTARI, ALBANIA

The red hood and embroidered cape of the upper-class women (one at the right) are most gorgeous. The lower garment is a pair of voluminous bloomers

whose ancestors, a hundred thousand strong, emigrated when the Turks overran Albania. The Albanians of Italy to this day conserve their racial distinctiveness. The unwillingness or inability of the Albanians to modify their individuality has found its reflex tragedy in the continued existence of the Albanian tribal system and the perpetual intertribal feuds. As a result, Albania has not been able to present a united front against a common enemy.

Only one great, unifying national hero has ever arisen for the Albanians—Skanderberg. He died in 1467, after winning 21 pitched battles from the Turk. His death left Albania without a leader, and the brave Albanians, who knew no loyalty or law beyond that of the family and clan, fell under the might of Mohammed the Second, conqueror of Constantinople. Mohammed could crush, but not subdue, the Albanians; nor have the successive sultans been able to accomplish that great desire. The best they could do was to humor them, and to the last day of Abdul Hamid's tyranny the Albanians were treated as a peculiar people. Hamid bought their loyalty by levying upon them no taxes, by refraining from military conscription among them, and by taking the pick of these fierce mountaineers for his closest and most trusted body-guard. The details of the manner in which he pampered them are among the lore of Yildiz Kiosk.

THE YOUNG TURKS WERE RUTHLESS

When, after 1908, the Young Turks had acquired their constitution and were facing the overwhelming task of putting the Ottoman house in order, the treatment of Albania was one of the crucial problems. It should have been most

Photo by Theron J. Damon

ALBANIAN CHIEFS FROM THE MOUNTAIN REGION NEAR SCUTARI

carefully considered. By delicate handling, by the fulfillment of promises, and by a just sympathy with the real aspirations of an ignorant but potentially capable race, the Young Turks might have built up and solidified in the province of Albania an impregnable barrier against European aggression. Instead of that they have pursued a course which has been aptly described by the Constantinople correspondent of the London *Times* as the steam-roller policy. Disregarding advice from every competent quarter, the Young Turks strove to flatten out the Albanians to the level of the ignorant Turkish peasants in the desert plains of Asia Minor. Nothing could have been more preposterous or more certainly foredoomed to failure.

Bodings of the inevitable result—a non-Ottoman Albania—appeared in the autumn of 1909, but it was not until the spring of 1910 that a revolt assumed serious proportions. On April 5 of that year the Moslem Albanians of the northeastern corner of Albania along the railroad line took up arms against the government. For a few days the rebels held Kachanik Pass, but 50,000 Turkish troops were immediately poured into the region and the movement was smothered. Never more than a local affair, it was undertaken without any organization; Albania proper was scarcely concerned by the uprising.

The Young Turks thought, however, that the time was come to teach the lawless Albanians a much-needed lesson. Accordingly the troops collected for the suppression of the uprising were marched throughout Albania. One division went westward to Scutari, or Schodra, as it is known to the Albanians. They traversed mountain roads which for generations had been closed to any man accompanied by a Turkish soldier, for the Albanians liked not the uniform of Turkish authority. But now the mountain people, taken by surprise, were to be disarmed. After such a smothering as had been meted out to their brethren along the railroad line, outnumbered and opposed by machine guns, which are a strange terror to the simple Albanian, there was no hope in resistance. Their arms—the pride and oftentimes the sum of their

Photo by Theron J. Damon

ALBANIAN CHILDREN OF AN AUSTRIAN SCHOOL, AT SCUTARI

Photo by Theron J. Damon

ALBANIAN CHILDREN WHO HAVE KNOWN NO AUSTRIAN SCHOOL

Photo by Theron J. Damon

ALBANIAN CHRISTIANS OF SCUTARI LEAVING CHURCH

possessions—were taken from them, and in the shape of the outrageously cruel and uncalled-for bastinado they were likewise "given their lesson."

Another division of the Turkish forces marched southward and penetrated the peaceable valleys of central Albania.

SCHOOLS WERE CLOSED WITH THE BASTINADO AND LASH

At Elbassan, immediately on the granting of the constitution, the intellectual leaders of Young Albania had started a normal school. They were trying to prepare Albanians to become teachers of the hordes of their ignorant countrymen throughout the land. They were using the Albanian language and, according to the vote of an Albanian congress of the year before, were writing this language—a European one—in Latin letters. Under Abdul Hamid every attempt at writing or printing or giving instruction in the Albanian language had been stifled so far as possible. Only in the Austrian and Italian missionary schools of northern Albania, carrying out their Austrian and Italian political propagandas and exempt from the surveillance of the Sultan, had it been possible for the Albanian to study in his own tongue.

As for an alphabet, the Austrian politicians who are back of all the missionary work of the Austrian priests and who never cease to advance their Austrian schemes, looked askance at a future

Photo by Theron J. Damon

A GROUP OF REBEL ALBANIAN CHIEFS AND AN ALBANIAN FROM THE COLONY IN ITALY

Albania whose Italian—as well as Austrian—trained leaders should be united by a common language and a common alphabet. Accordingly a lengthy, laborious alphabet was invented and saddled upon the school children of the Austrian missions. This would help to open dissention for the future, when Austria mayhap should inherit the land and should find it necessary to use her wiliest tyranny in Austrianizing the Albanian.

The Elbassan Normal School, with its sensible Latin alphabet and its freedom from outside propaganda, was, therefore, a beacon light in the darkness of Albania. It had no religious bias—Moslem and Christian were brothers without distinction. The founders had but one aim, the uplifting of the Albanian race. They were not revolutionists in the political sense of the word. They wanted to coöperate with the new Young Turk government, and only demanded that the application of the newly granted constitution should have something in common with its fundamental promises.

But when the Turkish soldiers arrived in Elbassan in the summer of 1910 martial law was proclaimed; all persons connected with the normal school or sympathizing with its progress were hunted down, led before the military authorities, and beaten in a manner too repulsive to detail. The bastinado and the lash were applied to many of the most enlightened people of Elbassan; the treasurer of the normal school was flogged beyond belief; the director and several of the teachers effected their escape. The military authorities searched out and flogged the persons who were responsible for a telegram previously sent to Constantinople, asking that instruction in Albanian schools should be given in the Albanian language and in the Latin characters. Then the soldiers were marched off for other similar deeds, having "shut up that school and given those Albanians a lesson they would remember."

UPRISINGS BY THE ALBANIANS

As the year 1910 wore on trouble began to arise for the Turks in the chancelleries of Europe over the scandal of the military orgies in Albania and of the closing of the normal school; likewise over the scandal of the equally brutal and, if possible, still more uncalled-for "disarmament" of the Christians in Macedonia. Some parties always exist

Photo. by Theron J. Damon

THE MAIN STREET OF SCUTARI, ALBANIA: TURKISH SOLDIERS WHO HAVE COME TO PUT DOWN THE REVOLT

in Europe whose political interests can be furthered by championing the wrongs of the oppressed; and though hypocritical motives moved many of the European statesmen who aided the revelation, the truth of the Young Turks' accomplishments in Albania and Macedonia gradually became common knowledge. The Young Turk had revealed himself as the true son of his father. The leaders saw that they had made a mistake; but they would make no acknowledgment, and subsequent events have shown that they have had no change of heart.

In April, 1911, occurred an uprising of the Malissori, or Christian Albanians, of the province of Scutari, in northwestern Albania, along the Montenegrin frontier The revolt was one of the unfortunate and premature attempts of a desperate and brave, but disunited, people to throw off an intolerable yoke. Instead of developing into a general revolt, the uprising remained confined to the furthermost corner of Albania.

The true patriots of all Albania sink differences of religion and tribe in the great facts of a common heritage and a common yoke. They, the educated members of their race, were striving last year for a united effort toward attaining justice for all Albania. These leaders were, unfortunately, ill-organized, without funds, and without experience. They received no support from the great bulk of Moslem tribes, many of whom, however, had been so thoroughly disarmed that they could not think of joining a rebellion. The Catholic Mirdites, a strong tribe south of Scutari, had few rifles, all of old type, and hesitated about coming to the support of the Malissori revolt until it was too late.

Montenegro was the backbone of the uprising, through the support which she and her people gave to thousands of Albanian refugees who in the previous winter had crossed the frontier and who in the spring went back to Albania prepared for fight. Thus in a remarkable manner was buried the hatchet, or rather the knife, which for generations and centuries had been unsheathed between the Slavic Montenegrin and the autochthon-

ous Albanian. But Montenegro found herself dangerously involved in Albanian affairs in disaccord with the diplomacy of Europe and especially of her friend and benefactress, Russia; and so Montenegro finally left Albania in the lurch. Despite this fact, however, the Turks were obliged to make with the rebel Malissori a peace which granted such important concessions that immediately complaints began to arise from the Moslem population of Scutari, who had not revolted.

"What! You grant favors to the rebels," they said, "but we who remained faithful continue under the old burdens." It was like the complaint of the unprodigal son. Unfortunately the Turk could not mollify his faithful children as efficaciously as we imagine did the ancient Hebrew father. As for the Malissori arrangement, it was only a truce, for how long no one could say.

SCHOOLS ONLY CAN RELIEVE THEM

The future of Albania depends not only upon the will of Austria, of Italy, of Montenegro backed by Russia, of Greece, and of Turkey itself, each determined to have the Albanian part of the interminable Eastern Question settled in its own selfish way; the future of Albania depends largely on the amount of *education* which can be placed in the land before the fate of the 2 million inhabitants is irrevocably settled. With the exception, perhaps, of the intrepid Miss Edith Durham, the English woman to whom the wildest and most dangerous parts of Albania have been a peculiar stamping-ground, no one knows Albania and the Albanians better than Mr. James D. Bourchier, for a generation the special correspondent of the London *Times* in the Balkan peninsula. His striking article on Albania in the new edition of the Encyclopedia Britannica, after speaking of the struggles of isolated Albanian groups to agitate for better things in Albania, concludes thus: "The growth of a wider patriotic sentiment must depend on the spread of popular education." Once let untrammeled education exist in Albania and the Albanians will look after themselves.

Many of the Christian Albanians of the city of Scutari have been educated and have become prosperous, thanks to the Austrians or Italians. They fear the fanaticism of their Moslem brothers, and this, too, though in the mountains a few miles away, among the families of ignorant mountaineers, both the Moslem and Christian religions may be sheltered under the same patriarchal roof, and Moslem and Christian rites may be celebrated in the one squalid edifice of worship.

Again and again has the writer of the present article asked educated *Moslem* Albanians interested in the cause of their race why they did not preach to the Moslems of Scutari and elsewhere the brotherhood of Moslem and Christian. Without hesitation, but with shame and with firm-set lips, the answer has come, each time the same: "It is impossible. The Moslems are ignorant. They must first be educated; then they will understand."

Just before the dissolution of Parliament, in January, 1912, an Albanian deputy, one of the chief spokesmen of his race and at present a leader of the rebels, declared, "If the Turks keep on despising the non-Turks, they will bring the country to ruin. I say this because I love the Turks, whose existence is needful to us, and in order to safeguard their existence." The Albanian deputy was speaking for his people.

THE ALBANIAN DREADS THE FUTURE

The Albanian fears lest, instead of acquiring the prayed-for and fought-for liberty, his dear mountains and wild gorges and fertile valleys be divided among the vulture nations, and lest he be absorbed by an alien race. Austria threatening to come down from the north; Italy, menacing from but a step away on the other shore of the Adriatic—they are two enemies whom, in spite of the schools and hospitals and churches lavishly bestowed in northwestern Albania by their representatives, the Albanians hate worse than they hate the Turks. The Albanian dreads Austria and Italy just as a prophetic Pole might have dreaded the three despoilers of his native

Photo by Emma G. Cummings

A GROUP OF MONTENEGRINS ON THE MAIN STREET OF CETTINJE, THE CAPITAL OF MONTENEGRO

land. The Albanian fears, likewise, a European conference in his regard, lest Montenegro and Greece should be allowed to aggrandize themselves at the expense of Albania. The ideal alternative for which he longs is a well-governed Turkey of which he will be one of the bulwarks.

Generations of Turkish overlordship have taught him, however, that he may not expect justice from the Turks. The revolution of July, 1908, gave a momentary gleam of hope, but the blackness of despair immediately settled down, blacker than before. The bastinado, the bullet, and the prison-cell have been the only reward for the craving for "something better." It is true that the Albanians who had been neglected for centuries were not ready to take kindly to some of the provisions of "Constitutionalism." The ignorant peasant, never having paid taxes and never having been drafted for military service, did not appreciate the new "equality," which became manifest to him in the payment of taxes like all the other inhabitants of Turkey and in the contribution of his quota of martyrs on the torrid sands of the Yemen.

The Albanians had many things to learn. The instruction should and could have come through their already enlightened leaders.

But the stupid Turk did the only thing he knew how to do—he marched his armies into Albania. Thereby, instead of utilizing the possibilities of enthusiastic loyalty, he more firmly rooted the age-long feeling of distrust and hate.

Speculation as to the future of Albania only leads one into impenetrable mazes, for the Albanian problem is bound up with the solution of the far-reaching Eastern Question, that teaser of Europe through the generations. The Crimean War was fought to solve it, but in more intricate form it rose again in the Russo-Turkish War of 1877-1878. The mandataries of Europe at Berlin in 1878 bungled the now obsolete Treaty of Berlin. Is it too much to hope that since that

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PEASANT WOMEN WITH PACK DONKEYS ENTERING CETTINJÉ, THE CAPITAL OF MONTENEGRO

Photo by Emma G. Cummings

THE MARKET PLACE OF CETTINJE: A GROUP OF NATIVES WEARING PISTOLS IN THEIR BELTS

time there has been raised up a wiser and more benevolent generation of diplomats? Yet the Near East is always hoping for a solution and end of the insufferable conditions which, under the Old Turks, made, and now under the Young Turks are making, of the Ottoman Empire a byword.

Today Albanians, Arabs, Armenians, Bulgarians, Greeks, Servians, and the very Turks themselves are suffering, as for ages, from the blight of Turkish rule. Of these unfortunate peoples, the Albanians are among the first who should receive the attention of an unselfish outside world.

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MARKET SCENE IN A TYPICAL BULGARIAN TOWN: RUSTCHUK, ON THE DANUBE

THE RISE OF BULGARIA*

By James D. Bourchier

THE decline of the Ottoman power, which began after the retreat of the Turkish army from Vienna in 1683, was marked during the 18th century by increasing anarchy in the European and Asiatic provinces of the Empire. The Balkan lands were desolated by fierce bands of Janissaries and Krjalis, against whose ravages the Christian population found little other protection than such as was afforded them by the Klephts and Haiduks—the Greek or Slavonic counterparts to the insurgent bands of today.

Servia obtained internal autonomy in 1820, complete independence with an increase of territory in 1878, and was proclaimed a kingdom in 1882. Greece became an independent kingdom in 1832 and acquired Thessaly in 1881. The principalities of Moldavia and Wallachia, which had never been under direct Turkish administration, were united in 1861, obtained independence in 1878, acquiring the Dobruja at the same time, and became the Kingdom of Rumania in 1881. Bosnia and Herzegovina were practically annexed by Austria-Hungary in 1878, while a portion of southern Herzegovina fell to the share of Montenegro.

In the same year Northern Bulgaria became a tributary principality, and Southern Bulgaria, or "Eastern Rumelia," an autonomous province; the union of the two Bulgarias was effected in 1885. Lastly, Crete obtained complete autonomy in 1897.

The natural process of disintegration has been artificially arrested by the action of Europe, the mutual jealousies of the Great Powers preventing them from cooperating with a view to the only final and legitimate solution of the Eastern Question—the segregation, so far as is possible, of the various Christian nationalities now under Turkish rule and their incorporation with the adjoining free and kindred communities.

This gradual dismemberment of the Ottoman Empire in Europe is due to a variety of causes. A nomad Asiatic race, the Turks display the same incapacity for change and progress, the same indolence and conservatism, the same repugnance to the spirit of modern Europe, which characterizes all Oriental peoples, with the brilliant exception of Japan. Their religion, their social system—above all, the position assigned to women—form obstacles to advancement, enlightenment, and the assimilation of modern ideas. They have been content to let commerce, industry, and all the arts by which wealth is accumulated remain in the hands of the subject peoples.

It was the duty of the *rayah* (non-Mohammedan) to till the ground and to make wealth for his master. So long as he was submissive and paid his taxes, he was free to retain his traditional customs, to worship as he pleased, and to settle his parochial and domestic affairs to his own liking.

The Moslem is a warrior and owes his dominant position to the sword; as a conqueror, he exercises the *jus belli,* reserving for himself the privileges of government and military service and leaving to the *giaour* (Christian) the duty of providing ways and means for the maintenance of an alien authority (see also page 1143).

The Moslem drives the administrative engine; the Christian finds the fuel for stoking it. A State founded on such a system could never acquire solidity or develop into a homogeneous polity (see pages 1132 to 1147).

The gulf fixed between the conqueror and the conquered was never bridged; in later times it has even widened. The interference of the Christian powers; the spread of education among the subject races, bringing with it in each case an awakening of national consciousness; the gradual percolation of modern ideas; the doctrines of the French Revolution; and, later, the principle of nationalities, exemplified in the realization of Italian and German unity, have all tended to this increased estrangement.

* This article is abstracted from the chapter on the Balkan States, by James D. Bourchier, in "The Balkan Question." John Murray, London.

Photo by Felix J. Koch

CHRISTIAN PEASANT WOMEN: SOFIA, BULGARIA

The movements which culminated in the liberation of Servia, of Greece, of the trans-Danubian principalities, and more recently of Bulgaria, were heralded in each case by a literary renaissance and an educational propaganda. The schoolmaster has gone hand in hand with the insurgent chief, and the same individual has often combined the two functions.

THE BULGARIANS HAD MORE DIFFICULTIES TO OVERCOME THAN ANY OTHER SUBJECT RACE

The Bulgarian national revival, the last in order of time, has been attended by peculiar complications. In their efforts to obtain political freedom and the union of their race, the Bulgarians have found themselves confronted not only with the power of Islam, but with the hostility of sister Christian nations. Thus a new factor has been introduced which renders the struggle infinitely more arduous.

The Bulgarians, indeed, have few friends, but they manifest no signs of despair. In the short period of their political existence they have gone through so many vicissitudes that they have become inured to desperate situations. Their tenacity, their shrewdness, their dogged perseverance—the characteristics of an agricultural race—their cool-headed judgment and intuitive sagacity, and—shall we add?—the luck which has hitherto attended them, may once more stand them in good stead (see pages 1117 and 1127).

A hundred years ago the existence of the Bulgarian race had been almost forgotten by Europe. A nation which, under its powerful Tsars Simeon (893-927) and Ivan Asên II (1218-1241), had ruled over the greater part of the Balkan Peninsula had been practically obliterated by four centuries of Turkish despotism and Greek ecclesiastical domination (for the origin of the Bulgarians, see page 1122).

The Bulgarians had suffered more severely from the Turkish conquest than any of the other Christian races of the peninsula. Their geographical position in the heart of the peninsula isolated them from Christendom and exposed them to the ravages of the Turkish armies which traversed their country during the campaigns against Austria and Russia.

An industrious agricultural race, they became the serfs of the Mohammedan

Photo by Felix J. Koch

ONE OF THE MONKS AT THE GREAT MONASTERY OF RILA, BULGARIA

land-owners or beys, some of whom were descended from Bulgarian noble families who renounced Christianity after the Turkish conquest. The proximity of the great centers of Turkish military power, Adrianople and Constantinople, riveted their chains and precluded the possibility of an uprising.

It is therefore not surprising that the Greek and Servian movements in the earlier decades of the last century found no counterpart in a Bulgarian insurrection. The national spirit was extinct and national consciousness had ceased to exist.

But the Turkish temporal power was not the only factor in the effacement of Bulgarian nationality. From the earliest years of Ottoman supremacy all the Christian races, comprised under the designation Rûm-milleti, were placed under the spiritual domination of the Greek Patriarchate, which thus constituted an ecclesiastical *imperium in imperior*. The Patriarchate, though styled Œcumenical or Universal, has always been an essentially Greek institution, and the Greek clergy under its control have never failed to labor for the spread of Hellenism.

Toward the middle of the 18th century Greek ecclesiastical ascendancy was at its zenith; the Slavonic patriarchates of Ipek and Ochrida were suppressed, almost all the Bulgarian dioceses were filled by Phanariote prelates, and the schools, in which Greek alone was taught, were controlled by the Greek clergy. The Phanariote ecclesiastics, who, like the Moldavian and Wallachian hospodars and the Turkish governors, paid large sums for their appointments, recouped themselves by heavy dues levied on their flocks, and the peasantry

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BULGARIAN WOMEN MAKING NATIVE BREAD

suffered grievously from their rapacity and venality.

THE BULGARIAN LANGUAGE WAS WRITTEN IN GREEK CHARACTERS

So effectually had the process of Hellenization been carried out that by the end of the 18th century Greek had become the language of the upper classes in the Bulgarian towns, while the ignorant peasants, though retaining their Bulgarian speech, declared themselves to be Greeks. Similar conditions prevail today with regard to the Bulgarian peasants in Macedonia who remain under the jurisdiction of the Patriarchate, the so-called "Bulgarophone Greeks," who number perhaps 300,000, and who, with the Patriarchist Vlachs and Serbs, are styled "Greeks" in statistics compiled at Constantinople and Athens (see page 1127).

The resurrection of the Bulgarian nation is one of the wonders of the past century. Every trace of the former national existence, every record of the old Bulgarian dynasties had vanished; "with the Ottoman conquest literature disappeared; the manuscripts became the food of moths and worms or fell a prey to the fanaticism of the Phanariote clergy." The library of the Patriarchs of Tirnovo

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NATIVE BREAD DRYING IN A VILLAGE STREET: BULGARIA

survived till 1825, when it was burnt by the Greek Metropolitan Hilarion.

When writing was employed for commercial or other purposes, the Bulgarian language was written in Greek characters.

The precursor of the literary revival was the monk Paissi, of Mount Athos (1762), whose *Istoria Slaveno-Bolgarski*, a history of the Bulgarian tsars and saints, recalled the long-forgotten glories of the race. A number of Bulgarian refugees and merchants at Bucharest initiated the educational movement. The result of their activity was the appearance of a series of simple educational works—grammars, elementary treatises, etc.—written in the modern language.

The opening of the first Bulgarian school at Gabrovo in 1835 marked an important era in the history of the national movement; within the next ten years some fifty Bulgarian schools were at work, and education had ceased to be a Greek monopoly. In the establishment of schools a leading part was played by Neophyt, a monk from Rilo monastery, where the Slavonic ritual and language had been maintained throughout the long dark ages of alien domination.

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BULGARIAN PEASANT AND TEAM OF DOMESTIC BUFFALO

THE BULGARIANS REVOLT AGAINST THE SPIRITUAL AUTHORITY OF THE GREEK HIERARCHY

A revolt against the spiritual authority of the Greek hierarchy followed. The history of this remarkable struggle, which reveals the peculiar tenacity and perseverance of the Bulgarian character, has never been adequately written. The conflict continued for 40 years (1830-1870). The Bulgarians addressed incessant memorials and petitions to the Patriarchate, which sometimes appeared disposed to negotiate, but in general opposed a resolute *non possumus* to all their demands. The Greeks denounced the leaders of the movement as guilty of "phyletism"—that is, the introduction of racial questions into the government of the church—and induced the Porte to banish some of them to Asia Minor.

On their part the Bulgarians maintained a continual agitation in the districts which now constitute the principality and in Macedonia, and some of the Greek prelates were compelled to take to flight. At length the Bulgarian leaders, despairing of a compromise with the Patriarchate, determined to follow the example set by some of the former rulers of their nation and to transfer their allegiance to Rome. Their design was favored by the Emperor Napoleon III who saw an opportunity for the increase of French influence in the East; a deputation proceeded to Rome, and a priest named Sokolski was consecrated bishop of the Bulgarian Uniate Church (1861).

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A GROUP OF INDUSTRIOUS BULGARIAN WOMEN IN A VILLAGE ON THE ROAD FROM THE DANUBE TO SOFIA

The threatened defection of the Bulgarians from the fold of the Orthodox Church excited alarm in Russia, where it was recognized that something must be done to prevent the "little brothers" from lapsing into error. The first step was the secret deportation of Mgr. Sokolski, who disappeared from the scene, and was, it is stated, immured in a Russian monastery. The principle of nationalities, at this time so much in vogue in western Europe, found its counterpart in the Panslavist movement in Russia; a great "Slavophil" congress was convoked at Moscow in 1867, and General Ignatieff, a noted Panslavist, became Russian Ambassador at Constantinople.

THE BULGARIAN CHURCH IS ESTABLISHED

Not only Russia, but France and England, now supported the Bulgarian cause, and the Grand Vizier in 1869 drew up a new scheme of ecclesiastical organization, which, however, was rejected by the Patriarchate. At last the Sultan, nothing loath to create a permanent barrier between his Christian subjects, issued a firman establishing the Bulgarian Church

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MOHAMMEDAN WOMEN: RUSTCHUK, BULGARIA

under an Exarch resident at Constantinople (February 28, 1870).

The creation of an autonomous Bulgarian Church possessed important political significance. Not only was the existence of the Bulgarian nation recognized, but its geographical limits were to some extent defined, the right of appointment to dioceses (under Article 10) extending as far south as Florina. Undaunted by its defeat, the Greek Patriarchate continued to resist, and contrived to delay the execution of the firman till 1872, when the first Bulgarian Exarch, Mgr. Antim, was elected. It then shot its last bolt by declaring the new church schismatic and excommunicating all its adherents. No doctrinal apostasy could be alleged against the Bulgarians, whose aim was to reconstitute the old autocephalous national church formerly represented by the patriarchates of Preslav, Tirnovo, and Ochrida. But, while the ancient Patriarchates and the various non-Greek autocephalous churches were established in independent States, the new Bulgarian Church was set up side by side with the Greek Patriarchate in the Ottoman Empire, the principality of Bulgaria not being then in existence. The indignation of the Greeks may therefore be easily understood.

The fulmination of the Patriarchate has exercised a deterrent influence over a certain portion of the Bulgarian population, which, fearing the reproach of

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BULGARIAN GYPSIES: RUSTCHUK MARKET

schism and the consequences of excommunication in the world to come, has refrained from adhering to the new national church.

The acquisition of ecclesiastical autonomy gave a fresh impulse to the educational activity which has done so much for the consolidation of Bulgarian nationality. During the prolonged struggle with the Patriarchate various revolutionary chiefs endeavored to incite the people to revolt against the Turks, but without success. The Bulgarian movement, hitherto conducted by pacific means, now underwent the influence of the Panslavist propaganda, of which General Ignatieff was the leading spirit; a secret organization spread its ramifications throughout the Slavonic provinces of Turkey, and the population, already exasperated by the severities of Midhat Pasha, who administered the "vilayet of the Danube" from 1864 to 1868, were ripe for revolt when the insurrection in the Herzegovina and Bosnia (1875) precipitated the catastrophe.

The Bulgarian rising, which took place prematurely in the districts of the Sredna Gora and the neighborhood of Philippopolis (May, 1876), was prompted by the fear of a general massacre, which was only too well founded. It is unnecessary to describe the horrors which followed. Shefket Pasha, the Turkish commander, was apparently given a "free hand" by the Sultan, bashi-buzuks and Circassians were let loose upon the villages, and within a few weeks some 25,000 to 30,000 men, women, and children were massacred. For these exploits Shefket

Photo by D W. Iddings. Copyright by Keystone View Co.

THESE ARE NOT BEEHIVES, BUT BULGARIAN NATIVE SHEEPSKIN HATS DRYING IN THE SUN, NEAR KUTLOWITZA, BULGARIA

Photo by D. W. Iddings. Copyright by Keystone View Co.

DRIVING GEESE TO MARKET: BULGARIA

Pasha was rewarded with the governorship of Erzeroum, while Achmet Aga, a Pomak chieftain, who put 5,000 peasants to the sword at Batak, received the order of the Mejidieh.

Russia then came to the rescue of her little neighbor, and by the defeat of the Turks in the war of 1877-1878 obtained for the Bulgarians partial freedom.

The treaty of San Stefano (March 3, 1878), dictated by the victorious Russians at the gates of Constantinople, practically realized the aspirations of the Bulgarian nation. The new autonomous Bulgaria which it created extended from the Black Sea to the mountains of Albania and from the Danube to the Ægean. It possessed an outlet to the Mediterranean at Kavala, included the districts of Pirot and Vranja, subsequently attributed to Servia, and comprised all the regions of European Turkey in which the Bulgarian element predominates except Dobruja, which

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BULGARIAN BOY SCOUTS BEING DRILLED BY AN OFFICER OF THE ARMY

Bulgarian patriotism, which has never been doubted, is more marked now than ever before. Even the boys not yet out of their teens volunteer to go to the front. They display a pronounced ability for things military, and, in a country where the males at the age of eighteen are called upon to bear arms, this preliminary training is of much value to the nation.

Photo by Felix J. Koch

VILLAGE LIFE: BULGARIA

Russia reserved as compensation to Rumania for her own annexation of Bessarabia.

But the Great Powers, believing that this extensive territory would become a Russian dependency, intervened on the initiative of England. There can be no doubt that such a consummation was held in view by the liberating power; but the dogged tenacity of character which subsequently enabled the Bulgarians to maintain their independence against enormous odds was at this time little suspected either by Russia or by the powers which aimed at counteracting her designs.

The treaty of Berlin followed (13th July, 1878). The "Big Bulgaria" of San Stefano was divided into three sections. The region between the Danube and the Balkans, with the districts of Sofia and Kiostendil, became the tributary principality of Bulgaria; the tract between the Balkans and Rhodope—the upper valleys of the Tunja and Maritza—with the maritime district of Burgas, constituted an autonomous Turkish province, described as "Eastern Rumelia," under a Christian governor-general; the remaining territories, comprising the greater part of Macedonia and the Bulgarian sanjaks of the Adrianople vilayet, were left under Turkish administration.

The inhabitants of the principality were allowed to frame their political constitution and to choose their prince, his election being confirmed by the Porte with the assent of the Powers; the autonomous province of Eastern Rumelia received its organization at the hands of a European Commission; all that was done for the unhappy districts handed back to Turkish rule is recorded in the much-quoted article 23 of the treaty.

From the first hour of their liberation the Bulgarians of the newly created principality manifested a strong democratic spirit, and a firm determination to secure for themselves a full measure of political freedom and complete national independence. The peasant deputies, who formed the "Assembly of Notables," which met at Tirnovo in 1879, adopted as their watchword, "Bulgaria for the Bulgarians."

In 1885 Eastern Rumelia revolted from the Turkish rule and united with Bul-

garia, to which it naturally belonged by all laws of ethnography and geography. In October, 1908, Prince Ferdinand proclaimed Bulgaria an independent kingdom, and thus thirty years after the Bulgarian war of independence their freedom was officially recognized in Europe.

This virile, laborious, thrifty, and persevering race has displayed many qualities which entitle it to play an important part in the future history of southeastern Europe. During the thirty years of its troubled existence the young Bulgarian State has made almost phenomenal progress. Education has advanced rapidly; public works have been instituted on a large scale; the country has been covered with a network of railways; wealth has undoubtedly increased, and order has been maintained, often in circumstances of great difficulty. The military organization receives high praise from foreign experts. Notwithstanding the recent economic crisis, the financial situation compares favorably with that of the sister States, inasmuch as the national debt is proportionately small.

The Bulgarians indeed have worked wonders. "They have existed since the treaty of Berlin in conditions anything but favorable to development. They have had no active friends, and they have had to contend with very active and unscrupulous foes. Assassins have been hired to murder their leading citizens; foreign emissaries have lived among them to stir up revolution by the basest means; they have had to fight the Servians, and they have lived in constant apprehension of invasion by a far more powerful foe. They have faced all these difficulties with a calm courage and perseverance of which any race might be proud, and have proved themselves the most solid and trustworthy of the claimants for the reversion of the Turk" (see also pages 1106 and 1127).

The Bulgarians have always regarded the boundaries of San Stefano as more or less adequately defining the rightful limits of their race; beyond those boundaries there is no considerable Bulgarian element in any part of the peninsula except the Dodruja, and the national energies have therefore been concentrated on Macedonia and the Adrianople vilayet. The great Macedonian immigration into Bulgaria—there has been no similar influx into Greece or Servia—has had a powerful influence on popular feeling and political development in the principality, and has considerably affected the economic situation.

THE RACES AND RELIGIONS OF MACEDONIA*

By Luigi Villari

Author of "Russia under the Great Shadow"

HAD the population of Macedonia been homogeneous, the Macedonian problem would have been settled long ago, but the mixture of races has ever been a marked characteristic of the Balkan Peninsula, and of no part of it more so than of Macedonia.

It is necessary to begin by explaining what is meant by the term Macedonia. The country forms neither a racial, a linguistic, nor a political unit. Geographically it is a unit, being bounded by the Shar Dagh on the north, the Albanian mountains on the west, the river Bistritza and the Ægean Sea on the south, and the Rhodope mountains on the east, and at a remote period of its history it formed a kingdom. The country which we now call Macedonia consists of the three vilayets of Salonica, Monastir, and Kossovo, and the Macedonian question refers to the conditions of those provinces. The expression, however, is often extended to the Adrianople vilayet as well, where the conditions are somewhat similar. But, geographically, it is quite separate from Macedonia.

It must be remembered that the Turk-

* From "The Balkan Question," edited by Luigi Villari.

Photo by Felix J. Koch

A CAFÉ IN MACEDONIA

ish division of the empire into vilayets was not made with any regard to natural or ethnographic lines of demarcation, but rather with a view to including as many conflicting elements as possible in the same territory, so as to simplify the task of government. This confusion of tongues and creeds makes the problem of Macedonian reform or autonomy more difficult than it was in the case of Greece, Crete, Bulgaria, or Servia.

But it is not only the Turkish government which is to blame for this mixture of races. Macedonia has for two thousand years been the "dumping ground" of different people and forms; indeed, a perfect ethnographic museum. The mountainous nature of the interior made it a difficult country to conquer, and the various invaders were never able completely to absorb the different peoples whom they found in it.

While the greater part of a district was occupied by the invader, the aboriginal inhabitants retired into the mountain fastnesses and there maintained their existence; one race established itself on the seacoast and another held the interior. At the same time, certain centers—large towns, seaports, fertile plains—attracted men of all the races for purposes of business or convenience. Thus in some parts of Macedonia we find one population predominant; in others another, and in others again two or more races exist side by side.

The division of races in Macedonia is not based wholly on differences of origin or of anthropological type. We may find characteristically Greek types, Bulgarian types, or Turkish types, but among those who call themselves Greeks are many whose type and whose origin is not Greek; and so it is with the others. In certain districts we find members of three distinct races speaking their respective languages, but all very similar in type.

Language is a more reliable means of classification, as the bulk of the Greeks speak Greek, of the Bulgarians, Bulgarian. But religion makes another distinction, and the Turkish method of

Photo by Felix J. Koch

AN OLD MARKET IN MACEDONIA

Photo by Felix J. Koch

SELLING LEMONADE IN ADRIANOPLE

classifying peoples according to their creeds cuts across the division according to race or language.

We may say that, for the Mohammedans, religion is the line of division, as all Moslems (except the Albanians) may not inaccurately be described as Turks; for the Bulgarians it is the national church, as practically every member of the Bulgarian party is a member of the Exarchist Church, although, of course, propaganda is the basis of the division, as the church is primarily a political institution (see page 1111); for the Greeks it is more a question of party, based on adherence to the Greek idea of civilization, and the Greek party contains many members of the other races; for the Servians and Rumanians it is chiefly nationality, for they have no separate church like the Bulgarians, and many who are Servians or Rumanians by race do not belong to the Servian or Rumanian parties.

The original inhabitants of Macedonia probably belonged to the great race which we call Thracians, of whom very little is known, while the western part of the peninsula was peopled by Illyrians. Descendants of the former are said to be the Kutzo-Vlachs, or Rumans, while the latter are represented by the Albanians.

The Greeks never succeeded in wholly Hellenizing Macedonia, their settlements being limited to the coast towns.

Then came the Roman conquest. Roads were built, towns were founded in all parts of the country, and military colonies established. The Thracians soon adopted the manners and the language

Photo by Felix J. Koch

TURKISH WOMEN AT SALONICA: TURKEY

of the Romans, who were the first civilized people with whom they had come in contact, and Greek influence survived on the coast alone. During the early days of the eastern Roman Empire, with its mixed Græco-Latin civilization, the two languages continued to coexist, as well as some of the local dialects.

THE BULGARIANS ARE SLAVICIZED FINNS

The first barbarians to settle permanently in the Balkan Peninsula coming from the northeast were the Bulgars, a Finnish people whose home was the middle Volga districts; they now occupied the southern banks of the Danube. The Slavs are said to have begun to pour into this region as early as the third century, but they were not established until after the Bulgarian invasion.

Their position in the east of Europe bears certain analogies to that of the Teutons in the west. They soon amalgamated with the Bulgars and gave them their language; the result of this union is the modern Bulgarian people, who may be described as Slavicized Finns.

No traces of the original Bulgars remain, although some of the Macedonians have Finnish features, and the Bulgarians of today speak a purely Slavonic language. The Slavs and Bulgarians drove other races of the interior before them, and Slavonic displaced all the others, save the Latin spoken by isolated settlements of Vlachs who retired into the mountains, and the dialect of the Illyrians, who were confined in the west region known as Albania.

Thus, as early as the ninth century we have in Macedonia most of the elements which now make up the population of that country—Greeks on the coast and in the large towns; Slavs in the interior; Illyrians or Albanians in the west, and isolated settlements of Latinized Thracians or Vlachs in the mountains; the Slavs themselves soon divide into two groups—the Slavicized Bulgars and the Serbs.

These various elements were partly under the dominion of the Eastern Empire, which was not, however, strong enough to Hellenize them, and partly

Photo by Felix J. Koch

A MOSLEM VILLAGE

In the villages the people are all of one faith and their costumes are in accord

under that of Slavonic princes. In time they might have amalgamated, although, owing to the peculiar conditions of the Balkan Peninsula, the process was bound to be slow. But the Turkish conquest supervened, and crystallized the different races, so that each preserved its nationality and its individuality. The Turks were never numerous enough to absorb the subject peoples, but they were strong enough to prevent any one of them from becoming predominant.

Unlike other conquerors, they did not attempt to impose their language or customs on the conquered, but they did try to convert them to Islam by maintaining those who refused to be converted in a position of inferiority. A number of Greeks, Slavs, Albanians, and Vlachs did become Moslems, but those who did not, and were prepared to face persecution and occasional outbursts of savage fanaticism, were able to preserve their nationality. Thus these conflicting elements survived until the present day.

This rivalry between the different Christian races has made the task of ruling Macedonia a fairly easy one. The Turks availed themselves of these differences to the full; but the constant oppression and persecution has ended by making all the Christians discontented, and the anarchy of maladministration and civil war has reached such a pitch that some change of régime is felt by all to be an absolute necessity.

THE MOHAMMEDANS OF MACEDONIA

Macedonia was the first country in Europe to be subjected to Ottoman rule, and long before the capture of Constantinople the Turks subjugated it and studded it with numerous Turkish colonies.

All travelers who know Turkey bear witness to the many good qualities of the individual Mohammedan, especially of the genuine Osmanli Turk—he is sober, patient, religious, cleanly in his habits, dignified in bearing.

But there is also no doubt as to his utter inability to make a good ruler, es-

Photo by Felix J. Koch

ONE FAMILY OF CHRISTIANS: MACEDONIA

pecially when he has to rule over Christians; the Turkish peasant, when living among Christians, whom he is taught to despise, who are unarmed while he is armed, who can obtain no justice for any violence committed by him against them, naturally becomes arrogant and cruel. In a mainly agricultural community quarrels as to the ownership of land are bound to arise, and in these cases it is always the Turk who obtains the advantage (see pages 1132 and 1144).

The Mohammedans suffer from the utter chaos and corruption of the Turkish government, and while in theory they are the privileged class, their privileges are given them in the form of license to pillage, and on occasion to murder, their Christian neighbors.

The Turks are essentially nomads, and, at all events in Europe, they are little more than an army of occupation holding the country by a military tenure. The idea of abandoning Rumelia (by Rumelia the Turks mean European Turkey generally) is regarded by them as a possibility to be contemplated, although, naturally enough, they do not wish to see it realized. If the country were to be placed under a Christian government the majority of them would probably return to Asia Minor in a short time.

Before the independence of Bulgaria and Servia both those countries contained a numerous Turkish population, which has slowly but steadily decreased since they were separated from Turkey. Another characteristic is their tendency to congregate in the towns.

More important is the decline of their numbers. The Turkish race shows a steady tendency to decrease, and it is said by some competent authorities that syphilitic diseases are largely responsible for this. In Macedonia, however, their numbers are kept up by artificial means. In the first place, the civil and military establishments maintain a quantity of officials and soldiers in the country; but the most numerous contingent is furnished by the *mohajirs,* or emigrants from the emancipated provinces. From Thessaly, Bulgaria, Bosnia, and Crete there has been a constant stream of Mohammedans to the dominions still under the rule of the Padishah, and the majority of them have been given lands in Macedonia, partly because there were more estates available and partly because it is now a frontier province once more. During the

Photo by Felix J. Koch

CHRISTIAN PEASANTS AT A PASHA'S COURT, IN THE INTERIOR OF TURKEY

recent rising the Ottoman authorities placed these *mohajirs* on the lands whose Christian owners had been murdered or had fled. This added a new disturbing element to the situation, as the emigrants are particularly bitter against their Christian neighbors.

THE CHRISTIANS OF MACEDONIA

With regard to the actual numbers of the Turks of the three vilayets of Macedonia, it is impossible to get reliable statistics. According to the most reliable calculations, the Mohammedan population does not amount to more than 700,000, of whom perhaps one-third are Osmanli Turks. The Christians are about 1,300,000 to 1,500,000, so that it is clear that the country cannot be regarded as a Mohammedan land, much less as a Turkish land.

The Christians of Macedonia are not united by language, by racial ties, nor by political aspirations. It is this which has hitherto impeded the emancipation of the country. There are in Macedonia four Christian communities—Greeks, Bulgarians, Serbs, and Rumans, or Kutzo-Vlachs; each of these nationalities is connected by ties of language and political aspirations with one or other of the free Balkan States.

The Christians of Macedonia all belong to the Eastern or Orthodox Church, with the exception of some Catholic Albanians in the north and a few converts of the various foreign missions. But ecclesiastically they are divided into two main churches, the Greek or Œcumenical Patriarchate and the Bulgarian Exarchate (see page 1112). To the former belong all the Greeks, Serbs, Vlachs, Orthodox Albanians, and a proportion of the Bulgarians; to the latter the majority of the Bulgarians. This division is one of the chief causes of hatred between Greek and Bulgar.

THE GREEKS OF MACEDONIA

After the capture of Constantinople by the Turks, the Greeks, although subject to periodical persecutions and massacres,

Photo by Felix J. Koch

SCENE IN A MACEDONIAN VILLAGE: ALL WOMEN OF A TOWN DRESS ALIKE

and frequent pillaging by their masters, were granted certain privileges, and eventually obtained a position of considerable influence in the Turkish Empire. By the term Greeks were meant not the Hellenes only, but all the ex-subjects of the East Roman Empire who adhered to the Orthodox Church. They were constituted into a *millet* or community, consisting of a lay and an ecclesiastical council, which dealt with the internal affairs of the people, and many important offices were habitually conferred on Greeks.

The Greeks came to be the brain of Turkey and the representatives of civilization in the Levant. The Greek language was the language of culture, even among non-Hellenic Christians, and the Greek Church a powerful agency for the promotion of Greek ideas. In the 18th century Greek influence declined, and the insurrectionary movements in what is now the Kingdom of Greece made the Turks look upon the Hellenes with suspicion and hatred. When Greece became free, the inhabitants of that country considered that the work of emancipation was but half completed, and aspired to the annexation of a much larger portion of Turkish territory. Some even dreamed of the revival of the Greek Empire, with the capital at Constantinople, but the majority limited their aspiration to Thessaly, Macedonia, and some of the islands.

In most of the towns of Macedonia the Greek element is the most conspicuous, and in some the wealthiest; trade and banking are to a great extent in their hands—although the Rumans and the Jews are keen competitors—and the shops and the inns all bear Greek inscriptions. In the cafés and public places one hears much Greek spoken, and most of the people with whom the traveler comes into contact are Greeks or Greek-speaking; but in point of actual numbers they are far inferior to the Slavs, and in places like Kastoria, where the town is thoroughly Greek, the surrounding country is inhabited by an almost wholly Bulgarian population. But the Greek pa-

Photo by Felix J. Koch

CHRISTIAN PEASANTS AT A BUTCHER-SHOP: SALONICA

Meat is sold already cooked as well as raw. Note the distaff on the left held by a Bulgarian woman, who is busily spinning as she walks to market (see page 1130)

triots do not count only the real Greeks as members of their party. They claim the Vlachs, the Orthodox Albanians, and the Bulgarians who do not adhere to the Bulgarian Church as Greeks, and call them "Vlachophone," "Albanophone," and "Bulgarophone" Greeks. In a word, they consider that all the Macedonians who have not joined the "Schismatic" Bulgarian Church, except the Servians in the extreme north, are adherents of the Greek party and of the "Grand Idea." So that, apart from all thought of conquest, they wish to prove that the greater part of Macedonia is a Greek land.

As for the actual numbers of the Greeks, the statistics vary considerably—from 50,000 to 700,000 in fact; but it is only the coastline and southwestern districts that can be regarded as purely or even prevalently Hellenic. Their numbers probably amount to about 300,000.

THE BULGARIANS OF MACEDONIA ARE TRUTHFUL AND PRACTICAL

The Bulgarians are a curious people in many ways, and different from all the other Balkan races. They are very hard working, very energetic, and of great staying power. They are not brilliant, certainly less clever than either the Greeks or the Vlachs, and not gifted with a keen commercial instinct. But as farmers and peasants they are admirable, and they are found all over the Balkan Peninsula, from Bucharest to Athens, and from Constantinople to Belgrade, employed in all kinds of work (see pages 1106 and 1117).

They are not yet highly civilized, but they have shown that under favorable conditions they are capable of astonishing progress. They are silent, unexpansive, some people might say sullen; but they have one great merit, rare, unfortunately among the peoples of Southeastern Europe—they are truthful.

They appreciate the value of education most highly, but they are thoroughly practical. They do not talk about their glorious ancestors like the Greeks or the Serbs; they think of the present and the future. If they have not great historic traditions, they are endowed with solid

Photo by Felix J. Koch

CHEESE BOOTHS ON GRAND BAZAAR: SALONICA

equalities which will make them play a large part in the destinies of the Peninsula.*

THE SERBS

It is not always easy to distinguish the Serbs from the Bulgarians in Macedonia, as the two races are often intermingled in the same districts, and their languages, though different in Servia and Bulgaria, become less so in Macedonia (see page 1131).

THE RUMANS OR VLACHS

The Kutzo-Vlachs, or Rumans, of Macedonia, present an interesting ethnographic and linguistic problem. They are usually admitted to be the descendants of the aboriginal Thracians, who amalgamated with the Latin colonists and adopted their language and civilization, and maintained their national characteristics by retiring to the mountain fastnesses of Macedonia. Latin influence also survived in the region north of the Danube, where large military colonies were formed. There is a strong resemblance between the language of the Macedonian Vlachs and that of the inhabitants of Roumania, although there is no political, and not much racial, kinship between the two, and they are separated from each other by a wide belt of purely Slavonic country.

The Vlachs of Macedonia are very much scattered, their chief settlements being on the Pindus Range and in the neighborhood of Monastir, Metsovo, Koritza, Krushevo, Vodena, etc. They descend in winter as far as the Gulf of Corinth, Avlona, and Durazzo, where the word Vlach has come to be almost synonymous with shepherd.

They are an extremely intelligent, fine-looking people, of considerable business ability. Their towns and villages, which are usually found on the summit of hills, are more solidly built than those of any other Balkan race. Krushevo, which suffered so heavily during a recent rising, was a notable instance.

* The Slavonic population of Macedonia is estimated at about 1,200,000, of whom the Bulgarians form much the largest proportion.

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TURKISH TROOPS: SALONICA

But in spite of their love of well-built stone-houses, the Vlachs have strongly ingrained nomadic habits, and in summer-time their towns are for the most part abandoned by all the able-bodied males, who wander about the country as itinerant merchants or *kiradjis* (dealers in and hirers of horses). Many of them are men of substance, and have business connections with all the important centers of the Balkans and Austria-Hungary.

As regards numbers, statistics vary, as usual, very considerably. According to some authorities, they are not more than 50,000; whereas Rumanian patriots affirm them to be at least half a million; probably they amount to about 100,000.

But, politically, their importance is very small. They have usually kept on good terms with the Turks, who, until the last rising, treated them less badly than their other Christian subjects. They attend to their trade and take little part in political movements. For a long time they were indistinguishable from the Greeks, whose language they spoke as well as their own, and the Greek party still count them as Greeks in their statistics of Macedonia.

THE ALBANIANS

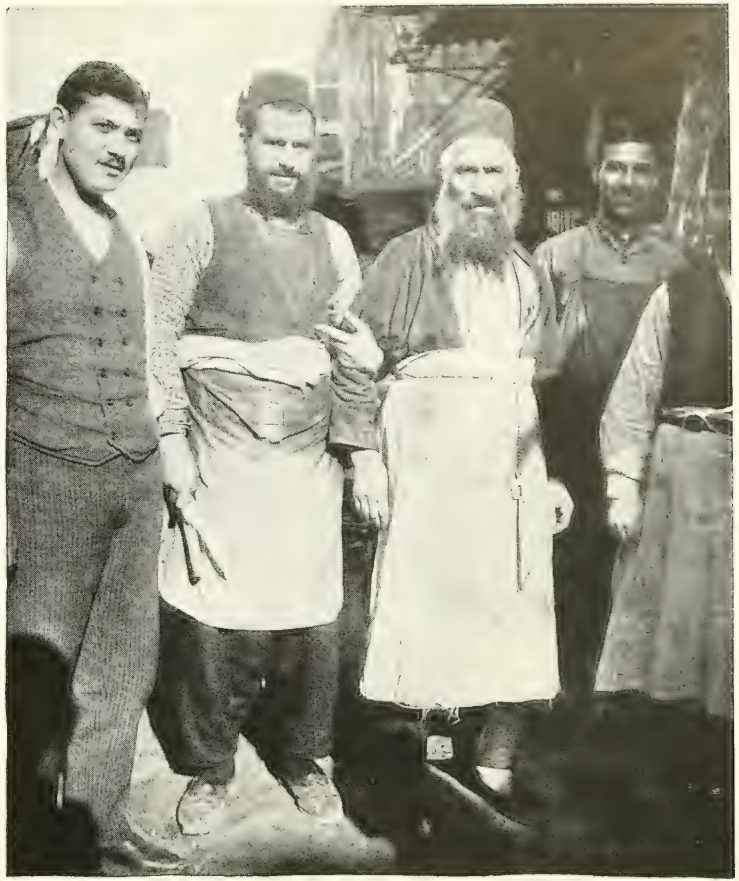
The western districts of the vilayet of Monastir and a large part of that of Kossovo are inhabited by a race wilder and more primitive than any to be found in Europe—the Albanians (see pages 1090-1103). Very little is known of this strange and interesting people, save that they speak an Indo-European tongue, but do not belong to any of the recognized groups of the Aryan family. It is probable that they are descended from the ancient Illyrians, who were driven westwards by the advancing waves of Slavs. Their language, like the people themselves, is wild and lawless, and has practically no literature. Even the popular songs are very few.

The Turkish government has deliberately kept them in a state of barbarism and ignorance, and makes use of them to overawe the neighboring peoples.

They are divided by religion into Mohammedans, who form two-thirds of the whole number — Orthodox Christians and Roman Catholics. But religion sits lightly on their shoulders, and they are by no means fanatical. In every tribe, save the Mirdits, who are all Catholics,

CHRISTIAN (BULGARIAN) MAIDEN: MACEDONIA

The Bulgarian women are always busy. This girl spins as she walks



STREET TYPES: SALONICA

Photos by Felix J. Koch

Photo by D. W. and A. S. Iddings. Copyright by Keystone View Co.

TYPES OF SERVIAN HERDERS

The progress of Servia has been disappointing. The other newly constituted States of the peninsula have escaped the misfortune of a native dynasty, but Servia has been afflicted with two, and the feud between the houses of Karageorgevich and Obrenovich has distracted the country throughout the whole period of its revived national existence. The perpetual conflict between Austrian and Russian influence, the deadly animosities of political groups, and the unfortunate domestic history of the Obrenovichs have been other factors of confusion, while the absence of a seaboard, the fiscal tyranny of Austria-Hungary, and thriftless financial management have hindered economic and commercial development. The wars of 1876 and 1877 with Turkey, and of 1885 with Bulgaria, also tended to the exhaustion of the country. Constitutional changes have been frequent, and three Servian rulers—Garageorge, Prince Michael, and King Alexander—have been assassinated. Amid all these drawbacks Servia has lagged in the race of civilization with her neighbors, Rumania and Bulgaria.

The most favorable feature in the condition of Servia is the prosperous condition of the peasantry; almost all are small land-owners, and well-to-do, if not rich, and poverty is almost unknown.—James D. Bourchier.

and even in many families, there are both Mohammedans and Christians, and, although constantly fighting among themselves, religion is hardly ever the cause of the quarrel. They have but little agriculture, no trade or industries, and indeed few occupations, save fighting. The Turks have used them in Europe much in the same way as they have used the Kurds in Asia, giving license to plunder and practical autonomy in exchange for fidelity to the Sultan and persecution of the other races. They also furnish a useful argument against reforms in Macedonia; for when the powers demand that the Sultan should fulfill his promises, a rising of the Albanians is at once threatened, and often actually takes place.

With all their barbarism the Albanians have many excellent qualities. They are brave, hospitable, and, if you succeed in winning their confidence and attaching them to your person, absolutely reliable. The foreign embassies and consulates in Turkey preferably employ Albanians as *kavasses* (orderlies) on account of their trustworthiness. They are by no means unintelligent, and have furnished the Turkish Empire with some of its ablest

generals and civil servants. But their best qualities only develop when they are out of their own country. In Albania they are always more or less savages.

Among the Catholic Albanians of the north, both Austria and Italy have done something in the way of education; the Franciscans and the Jesuits have opened schools in various towns, and the Italian government maintains colleges at Scutari and elsewhere. For the Orthodox Albanians the Greek Syllogos has established some schools. But for the Mohammedans nothing has been done. The Turkish government will not allow them to be taught in the Albanian language, and, indeed, refuses to recognize its existence, although most of them speak no other.

THE JEWS OF MACEDONIA

At Salonica, and in a few other towns of Macedonia, there are large Jewish settlements. Like nearly all the Jews of Turkey, they are descended from those driven out of Spain by Ferdinand and Isabella, and they speak a Spanish dialect to this day, but they usually know many other languages as well. At Salonica they form the majority of the population. Their favorite occupations are, of course, banking and trade, but the poorer Jews are boatmen, porters, servants, small shop-keepers, and in one or two districts even peasants.

They are the one subject race whom the Turk has never persecuted, and they are in consequence loyal subjects of his Imperial Majesty. They thoroughly know how to make a "good thing" out of the Turkish government, and in exchange for being left alone, they are its chief financial support. They are industrious, honest, and intelligent. A great many of them are the subjects or the protégés of the different foreign powers.

"GRASS NEVER GROWS WHERE THE TURKISH HOOF HAS TROD"*

By Edwin Pears

Author of "The Destruction of the Greek Empire," "The Fall of Constantinople"

AS THE abuses in the collection of taxes have done more, perhaps, than anything else to make the peasants of Macedonia discontented with their lot, by reducing them to the verge of starvation and to drive them into revolt, it is desirable to show at some length what these abuses are. The heaviest tax which has to be paid is tithe or *dime*. Its assessment and collection form a good illustration of the difference between the theory of Turkish law and its administration.

The law provides that the collection of tithe for the government shall be put up to auction or to public tender—that is, that bids shall be invited from private persons for the payment of a lump sum to the government for the right to collect one-tenth of the forthcoming harvest and other agricultural produce, such as the increase of sheep, cattle, and goats in a specified village or district. The surplus over and above the accepted offer will be the legitimate profit of the tax farmer. The bid is often highly speculative, and the successful bidder has to take his chance of bad weather, deficient crops, and a mistaken estimate. The government requires that the payment of the accepted tender, if any be accepted, shall be guaranteed by an approved third person. Its rights are thus secured.

The person whose tender has been accepted then arranges with the local authorities to make a valuation of each peasant's next harvest. For this purpose he, together with the peasant and one or more of the local authorities,

*From "The Balkan Question," edited by Luigi Villari. John Murray, London.

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TURKISH CADETS ON THE WAY TO THE FRONT

visits the crop upon which the tax is to be levied and makes the valuation. The tax-gatherer has usually made an arrangement by which, in addition to the sum secured to the government, a further sum will be paid to the local authorities. In all probability it is just in consideration of such a private arrangement that his tender has been accepted.

When, therefore, a valuation is made, it is almost invariably far in excess of what it ought to be. If the peasant wishes, he has the right to appeal against this excessive valuation to the local council, whose decision will be final. He is well aware by experience that their decision would be against him, and he therefore makes the best arrangement as to the valuation that he can, without wasting time on appeal. His bargaining will be on the excess of the estimate beyond the legal levy.

THE SULTAN OF TURKEY

Photos by James F. J. Archibald

TURKISH MILITARY: CONSTANTINOPLE

THE TERRIBLE WEAPON OF THE TAX-COLLECTOR

Should he refuse to accept an excessive valuation, the tax-collector has a terribly powerful weapon which he does not hesitate to use against him. The harvest is not allowed to be gathered until the authorities have given their consent, and this is refused until the illegal estimate has been paid.

The peasant sees his crops rotting on the ground or rapidly wasting away because he cannot obtain permission to gather it, but he is powerless. To save a remnant he will sometimes sacrifice half of what remains. The local *zaptiehs* (policemen) are at the service and in the pay of the collector, and until they receive word from him they will see that no obstinant peasant begins harvesting. There is no commoner form of injustice done to the peasants than the refusal to give permission to gather their crops until an illegal as well as the legal portion of them is conceded to the tax-collector.

If the peasant remains obstinate and refuses to pay the illegal contribution, preferring to let his crop perish, even thus he does not escape. The *zaptiehs* (policemen) do not hesitate to seize and sell his cattle, and even his seed corn. The policemen are, in fact, regarded by the peasants, not as their protectors or as the representatives of law and justice, but as persons entirely at the tax-gatherer's disposal.

It may be said on their behalf that they are merely the tools of the higher officials, and that they, as well as the local watchmen, are miserably paid. Their pay is almost invariably many months in arrears, and their daily ration of bread is barely sufficient to support existence. To a large extent they live upon the poverty-stricken peasants who are forced to tolerate their exactions. The evils of collusion between the tax-gatherers and the local authorities press hardly on Moslem and Christian peasants alike; but as the *zaptiehs* (policemen) employed are Moslems, they naturally act more willingly against the unbelievers than against their coreligionists.

UNIQUE INDUSTRIES DESTROYED BY GROSS TAXATION

It is not in the collection of tithes only that gross abuses exist. Many other taxes and contributions, both legal and illegal, are exacted. Sometimes these are so excessive as to defeat the object for which they are imposed. Not long since, in one district, hundreds of apricot trees, on the dried fruit of which the people largely subsist during winter, were cut down by the peasants themselves in order to avoid the annual tax levied upon them. Vineyards near the capital, even, have been rooted up for the same reason. The growth and export of the hair of the Angora goat, which when manufactured is known as mohair, ought to be one of the most profitable enterprises in Turkey. Thirty years ago this goat only existed in the Ottoman Empire, but the tax levied upon the animals was so heavy that great numbers were killed, and Turkey has had to take a second rank in the production of mohair.

But added to all these burdens there is another which is still more grievous. The governors and other officials, who are appointed from the capital, have in many cases to pay the persons who have used their influence to have them named. This payment sometimes takes the form of a periodical contribution. The official recoups himself by taking pay and toll from the subordinates whom he in his turn appoints. These again make good their losses out of the peasants.

A convenient way of accomplishing this is to add the proportion intended for the officials to the amount which has been levied for transmission to Constantinople. Receipts are constantly refused, and the same sum is levied twice or three times over. Very commonly the practice is varied by giving receipts for a smaller sum than has been exacted, and the difference finds its way into the pockets of the collectors and local officials. One of the results of these irregular con-

Photo by International Press Photo Co.

A TURKISH GENERAL INSPECTING THE STREETS OF CONSTANTINOPLE

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TURKISH OFFICERS AND BARRACKS: CONSTANTINOPLE

Photo by James F. J. Archibald

A MOHAMMEDAN BOATMAN: CONSTANTINOPLE

tributions is that the peasant never knows what he will have to pay. He believes, and not without cost, that the measure of taxation is whatever can be squeezed out of him.

In addition to these taxes and irregular demands for money he has in many parts of the Empire, and notably in Macedonia, to meet the demands of men in the last-mentioned province, usually Albanians, who enforce exactions to which their legal right is of the most shadowy description. They or their fathers have chosen, as the Kurds likewise do in Armenia, to levy contributions from certain villages, nominally for protection against other brigands; but it is a protection with which the peasants would willingly dispense. Between the exactions of the tax-collectors with the *zaptiehs* at their beck and call, and those of these unsolicited "protectors," the life of the peasant becomes absolutely intolerable.

It is no part of my task to point out the wrong inflicted by such protectors and by the *zaptiehs* (policemen) upon the women of the peasants. It is sufficient to say that they are such as in all ages have "turned the coward's blood to flame." The extortions alone—heavy, arbitrary, irregular—levied upon all that the peasants produce, and enforced by *zaptiehs* and other officials, who can take the oxen from the plough, or seize the few cooking utensils, which are all that he may possess, and, in case he is supposed to have property which he is concealing, can send him without trial to the tortures of a prison, ought not to be endured. The peasant, in fear of official and private rapacity, is afraid to let it be known that he possesses anything of value. Living usually in constant fear of starvation and oppression, hopeless of any amelioration of his lot under existing rule, he becomes ready to risk his life in support of any movement which promises to better his condition.

DECAY AND DESOLATION FOLLOW THE TURKISH RULE

The history and present condition of the country justifies a feeling of despair for progress among the Turkish people. It is bad enough to find roads and bridges once well built now falling into decay; to see towns which even within

IMPERIAL LANCERS AT THE SULTAN'S PALACE: CONSTANTINOPLE

A TURKISH LANCER: CONSTANTINOPLE

Photos by James F. J. Archibald

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TURKISH TROOPS LEAVING CONSTANTINOPLE FOR THE FRONT

Photo by D. W. and A. S. Iddings. Copyright by Keystone View Co.

MOHAMMEDANS WASHING THEIR HANDS AND FEET IN FRONT OF A MOSQUE BEFORE ENTERING

Turkish times were populous and flourishing, now little better than heaps of ruins; to trace the sites of others which have entirely disappeared; to see today the same hindrances to trade and manufacture at work which have succeeded in past times in the impoverishment of a naturally rich country. It is worse to find that there has existed neither moral force nor patriotism sufficient at any time to strike at the all but universal corruption which is the principal cause and symptom of this decay.

The condition of the Turkish Empire today gives no evidence of ability on the part of the race to govern even a Moslem people. The Eastern proverb says that "Grass never grows where the Turkish hoof has trod." It is the simple truth that every province held by the Turk has become less productive than it was before, and has fallen in civilization under his rule; his misgovernment retards the progress alike of Moslem and non-Moslem subjects, though it falls with far greater weight upon the Christians.

But the full measure of the Turkish incapacity to govern is only shown when he has to deal with the Christian subject

Photo by D. W. and A. S. Iddings. Copyright by Keystone View Co.

A MOSQUE IN CONSTANTINOPLE

races. Four and a half centuries ago the Turk became master of Constantinople. Though greatly reduced in population and wealth, from what it had once been, its people and the other Christians who came under his rule were probably the most generally civilized people in the world. Under Turkish rule Constantinople has become the most retrograde capital in Europe. Under such rule, Athens, Bucharest, Belgrade, and Sofia, eighty years ago, were mere collections of mud huts, occupied by dejected and poverty-stricken people.

Since their inhabitants got rid of Turkish oppression these villages have rapidly grown into towns, have adopted the appliances of civilization, and are all making good progress. The first two, which have enjoyed freedom for a longer time than the others, are now well-built and well-governed cities with bright, intelligent, and progressive populations, and Sofia will soon run them close. To pass from any of these towns to Constantinople is to pass from a civilized to a barbarous city.

THE TURK CANNOT ASSIMILATE WESTERN PROGRESS

The Turk has been unable either to assimilate the civilization which he found

Photos by James F. J. Archibald

CHRISTIAN WOMEN OF CONSTANTINOPLE

CHRISTIAN WOMEN OF CONSTANTINOPLE

in the country, or to profit in any appreciable degree by that which exists in Western nations. He could, and did, prevent the Greeks and other Christian peoples who were subject to his rule from making that progress of which their recent history shows them to be capable. His treatment of the races subject to him absolutely barred anything like amalgamation with his own race, and the gulf which separates the conquerors from the conquered is wider now than it was when the Turks first entered the country.

The explanation of the failure of the Turks as rulers over the Christians is to be found in the facts that the latter are conquered people, that they are more industrious and intelligent than their conquerors, and, above all, in the difference of religion.

The Turks came into the country as nomad conquerors, and the Christians were largely dispossessed of their lands. But the Turkish nomads who obtained them, or who settled alongside of the Christians, have seldom shown any aptitude for agriculture, for manufacture, or for trade, and wherever Turkish and Christian villages have existed side by side, the latter, by the industry and intelligence of their inhabitants, have invariably shown more signs of prosperity than the former.

Poverty-stricken though the country everywhere now is, it still remains true that to pass from a Turkish to a Christian village is to pass from appalling poverty to poverty less conspicuous and less hopeless. Still, the Turk has never forgotten that he belongs to the conquering race; and though the Turkish peasant has just cause of complaint against his rulers, he has never ceased to believe that the Christians ought to be his inferiors in every respect, and especially in the possession of property.

In other words, the comparative wealth of his Christian neighbor appeals to his cupidity. It has been one of the main causes why the Turkish population, when permitted to plunder their neighbors, has looked upon massacre largely as an opportunity for loot. Massacres of Christians have in fact not only been one of the regularly recurring incidents in Turkish rule, but have always appealed to the desire for plunder on the part of the poorer Moslems.

Photo by Felix J. Koch

YOUNG TURKS

THE CURSE OF ISLAM

While the unvarying testimony of history shows the Turk to be incapable of doing justice to a subject Christian race, he is seen at his worst when his religious prejudices come into play. It is these prejudices more than any other cause which have always prevented, and still prevent, him from being a just ruler.

The religion of Islam, or Resignation, supplies a teaching which, in certain respects, works for righteousness, and in an early stage of human society undoubtedly constituted a progress on the existing systems. Of this aspect of its teaching I have nothing here to say; but I may be allowed to remark that while it is difficult to find words too strong to condemn the corruption and misrule which exists in every department of Turkish administration, I must not be understood to condemn all Turks. The common peasant, when not under the influence of religious prejudice, is sober, kindly, and hospitable. When, however, he rises to office, he is incapable of re-

Photo by James F. J. Archibald

STREET SCENE IN CONSTANTINOPLE

Photo by Felix J. Koch

A MOHAMMEDAN CARRYING A RAM TO BE SACRIFICED AT THE BAIRAM FESTIVAL: CONSTANTINOPLE

Photo by D. W. and A. S. Iddings. Copyright by Keystone View Co.

"HAMALS" (BURDEN-BEARERS) ON GALATA BRIDGE: CONSTANTINOPLE

sisting the evil influences of his environment. Even among the governing class there are found honorable and upright men who lament the general corruption and keep their own hands clean; but they are, unfortunately, powerless to mend matters.

On the other hand, it must not be supposed that the Christians in Turkish service are much better than the Turks themselves. Some of the most striking examples of men who could be named today as representatives of everything that is bad in the matters of Turkish rule are so-called Christians. Speaking of the system generally, and excluding individual cases, Turkish officials are incapable of even striving against the evils which surround them and by which they seek to profit.

Nevertheless, the statement is true that the religion of the Turk tends to make him incapable of being a just ruler over Christians. Mohammedanism produces this result by directly encouraging the domineering spirit of the conqueror over the vanquished by hindering the moral and material progress of the conquering race, and by widening the gulf between the rulers and their subjects.

The spread of Islam was largely due to the sword. Its teaching is that the *caffers,* or idolaters, are to be rooted out, but that the "People of the Books"—that is, the Christians and the Jews, are to be spared if they submit and pay tribute. At all times an unbeliever could save his life if he would accept Islam. Every career becomes open to the apostate. The dream of the pious Moslem is

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TURKISH HOMES ALONG THE BOSPHORUS, AT RUMELI HISSAR

that all races shall be driven within the domain of the Khalif. He is convinced that by virtue of his acceptance of the true faith the believer is placed on a higher plane than unbelievers. He is appointed to be a ruler over the "People of the Books," who are to be his *rayahs* (the term *rayah* is applied to all the non-Mohammedan subjects of the Porte) or cattle. With such a belief, it would indeed be remarkable if the conquerors' pride were not greatly increased, and if they did not become the most grievous of task-masters.

THE MOHAMMEDAN BELIEVES HE BELONGS TO A SUPERIOR SPECIES

A keen observer, of long experience in India, who is specially anxious to secure educated Mohammedans for the service of the State in numbers equal to their proportion of the population, declared that the greatest obstacle to their progress is what he calls "spiritual pride." As in Turkey, so in India the Mohammedan considers himself to be on a higher plane than the adherents of any other faith, Christianity included. He almost belongs to a different species. He

is a ruler by divine right, and Christians are, or ought to be, his *rayahs*. Nevertheless, in India he fails to compete successfully with the adherents of other, and even non-Christian, faiths, just as his co-religionist in Turkey fails in general progress when matched with the Christians.

Of course, to men who hold such opinions regarding their relationship to the professors of other creeds, all suggestion of equality before the law, or of equal rights with themselves, is nonsense. They have no desire to assimilate races whom Allah has placed in subjection to them.

It is this pride which has prevented the Turk from profiting by the learning and experience of the West. It is this proud and domineering spirit, engendered by conquest and strengthened and sanctioned by religious belief, which makes the Moslem incapable of being a just ruler of Christians.

THE DEGRADATION OF WOMAN BY ISLAM

The other characteristics of Mohammedanism which tend to prevent the Turk from acting justly to subject races are mainly two—viz., the position assigned to woman, and the deep-rooted belief in and influence of fatalism. Though these are of great importance in examining the influence of Islam upon the Turkish race, the space allotted forbids me to do more than indicate their effect. Each checks the moral and material progress of the race and renders the individual less intelligent than he would otherwise be.

The position assigned to woman is regarded by thoughtful Turks themselves as the most unfortunate part of the teaching of their religion. Polygamy is permitted. Repudiation of a wife, rather than formal divorce, is the common practice. The separation of the household is the inflexible rule. The common belief in Mohammedan countries—though such belief is declared by many competent authorities to be contrary to the true teaching of the Koran—is that woman has no soul. Family life or home life, as the term is understood in all Christian countries, is unknown.

The churches have rendered an inestimable service to the subject races of the Empire by the preservation of family life. Where woman is by law and custom degraded, the offspring, and in time the race itself, comes to be less intelligent, and, using the word in a large sense, less educated than in countries where children are brought up in the companionship of both parents. Being less intelligent, they are unable to become as prosperous as their neighbors of the Christian faith, whom they have been brought up to despise and speak of as cattle.

"NO TREATY WITH INFIDELS CAN BE BINDING"

The influence of fatalism prevents the Turk from providing for the future. Those who know the Turkish population best are the most deeply impressed with the hindrance to material progress and to mental development which arises from this belief. It operates upon every action in their lives. It has certainly helped to make the Osmanlis fearless soldiers; but the same belief destroys in the average Turk the desire to get on and the inducements to work. The answer of the poorer Turk, when asked why he does not do something by which he could profit, is: "What is written (in the Eternal Books) is written."

The resistance to reforms suggested by Europe which the Turk has so often displayed during the last century, has been, in fact, largely due to his religion. However enlightened a Sultan and a handful of reformers—like the famous Rashid, Fuad, and Aali of the Crimean War period—may have been, they have against them the *vis inertiæ* of the bulk of the Moslem population. Any change proposed by Europeans appears to them an invasion of their sacred rights. To demand that Christian *rayahs* shall be placed on an equality with Moslems is to invoke the silent if not spoken retort that no treaty with infidels can be binding.

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THOUSANDS OF PATRIOTIC GREEKS PACKING THE MAIN STREET OF ATHENS, GREECE, WAITING FOR THE LATEST WAR BULLETINS FROM THE FRONT

TWO POSSIBLE SOLUTIONS FOR THE EASTERN PROBLEM

By James Bryce

Author of "The American Commonwealth," "South American Observations and Impressions," etc.

The following article was written by Mr. James Bryce when a private citizen, as an introduction to "The Balkan Question" (John Murray, London), and is reprinted here without change. It summarizes the results of extensive travel in the Balkan countries and of a long study of the problem which has tormented the peace of Europe for generations.

THE high-water mark of Turkish conquest had been reached when Vienna was saved by the Polish King, John Sobieski, in A. D. 1683. Ever since then the recession of the water has been uninterrupted. Empires may take a long time to die. Looking back, we can see that the East Roman Empire steadily lost ground from the death of the Emperor Manuel Comnenus in A. D. 1180, yet it was not destroyed till the capture of Constantinople in A. D. 1453.

Much more rapid has been the decline of the Turkish power. One by one its European provinces have been stripped away. Hungary was lost, and then in succession Transylvania and Bessarabia, and the two Danubian principalities which now constitute the Rumanian kingdom, and Greece, and Servia, and Bosnia, and Bulgaria, and Thessaly, and eastern Rumelia, and Crete. In Asia also Russia has twice advanced her frontiers over territory that was once Ottoman. Egypt was long ago detached, and in our own time so also has Cyprus been.

Everywhere in the modern world the weak powers break up under the impact of the strong, and the Turkish dominion is exceptionally weak in proportion to the vast area it covers. It would, indeed, have before now been torn to pieces by revolt or absorbed by rapacious neighbors had not the mutual jealousies of the European States interposed a check, and had not the power of purchasing modern arms of precision given to the government, as it gives to every government, advantages against insurgents which did not exist in earlier days. If during the last hundred years the Turkish Empire had stood alone and unbefriended, as the east Roman Empire stood alone in the fourteenth and fifteenth centuries, it would before now have perished from the earth.

The process of decay goes steadily on for the most obvious of all reasons. The governing class in Turkey is incorrigible. Its faults are always the same. It cannot or will not change the policy which has brought the country to ruin. Sultans come and go; one is abler or more vigorous; another is feeble and heedless, or perhaps a mere voluptuary. But, so far as the administration goes, there is no attempt at improvement. One scheme of reform after another, extorted by the European powers, is promised or formally enacted, but no step is ever taken to carry out any of the promises.

The conditions are such that even if by some amazing chance such a man as Soliman the Magnificent or Akbar the Great were to come to the throne there is little probability that the process of decline could be arrested. It advances with the steady march of a law of nature. Every European statesman knows this. Every thinking man in Turkey itself knows it. That hopefulness must be blind indeed which does not recognize that the problem now is not how to keep the Turkish Empire permanently in being, but how to minimize the shock of its fall and what to substitute for it.

Not that its fall is necessarily close at hand. It may be delayed for some

Photo by A. C. Barler

A GREEK OF CORINTH

decades, conceivably even till near the end of the present century.

The only kind of reform which has ever succeeded is that which removes a province from the Sultan's control. This plan succeeded in Eastern Rumelia, has succeeded in the Lebanon, is succeeding in Crete. And this plan, applied on a large scale by successive steps to successive districts, means the substitution of a regular and comparatively civilized administration for that organized brigandage which has been the only kind of government the Turks have hitherto bestowed on their subjects.

The Turkish Empire stretches from the Adriatic to the Persian Gulf. It includes what were once the most populous and flourishing districts of the civilized world. Its population is now scanty in proportion to the vast area, and is probably (though no trustworthy statistics exist) rather declining than increasing. The Mussulman element is attenuated by moral and political causes and by the drain of military service; the Christian element by massacre. But once a stable and progressive government has been established, these regions will no doubt begin to recover, and within two or three centuries they may, such are their natural resources, such the advantages of their geographical position, rival or surpass their ancient prosperity. The question of their future is therefore a question of the highest interest in its economic as well as in its political aspects.

Broadly speaking, there are two possible solutions of the Eastern problem. One is the absorption of the existing nationality into the great dominions and great nations which border upon Turkey. The other is the growth of those nationalities, or some of them, into nations and States. European Turkey, for instance, may be conquered and seized by Russia, or be partitioned either between Russia and Austria, or perhaps between Russia and Austria, with some concessions of territory to Italy and Greece, the Bulgarians, Servians, Vlachs, and other inhabitants, losing after a time their individuality, and becoming blent in the great Slavonic mass of the two empires, and especially of Russia. Asiatic Turkey may be annexed to Russian Transcaucasia, or divided between the Tsar and some one or more of the European States which are believed to seek new dominions.

Such an absorption would undoubtedly bring some immediate relief to the wretched subjects of the Sultan—Mussulmans as well as Christians. (Let it be always remembered that the Mussulmans as well as the Christians must be considered, and have almost as much to gain by the destruction of the existing system as the Christians have.) Even the least

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THE MONASTERIES OF METEORA IN NORTHERN GREECE

The monks live in the buildings perched on the summit of the rocks seen in the photograph. The only means of ascent are by perpendicular ladders or in rope cages. The few monks who now live in these isolated quarters have joined the Greek forces in the attack upon the Turks.

MAP OF BULGARIA, SERVIA, AND MACEDONIA

progressive European government gives security for a life and property, permits wealth to accumulate and population to increase, and makes some provision for education. As Egypt has thriven under English administration, so has Bosnia under Austrian. If the Christian nationalities do not wish to be incorporated in the Austrian or Russian dominions, it is not because they prefer the Turk to the Russian or the Austrian, but because, looking for the early extinction of the Sultanate, they have ulterior hopes for their own people which that incorporation would destroy. There would, therefore, be some immediate gain to the inhabitants of the Turkish provinces from the extinction of European, and primarily of Russian rule.

This solution is that which seems easiest, and which may probably come about if things are left to themselves, Russia dividing with Austria the European part of the Ottoman dominions, and subsequently either acquiring for herself or dividing with Germany the Asiatic part. The same law which has carried her over all northern Asia and over half of central Asia, the law which carried the English in a century over all India, will naturally bestow upon her Turkey, or so much of Turkey as other European States do not prevent her from appropriating.

Is this result to be desired in the interests either of other States, or of the peoples of the East, or of mankind at large?

States which, like France and Great Britain, have got all they want already, and seek no share of the spoils, may well be unwilling to see an empire already gigantic extend itself over territories which might one day become formidable to its strength. Into the special motives which France may have for safeguarding her influence over the Catholics of the East or Britain may have in respect of her presence in Egypt and in India, there is no need to speak, for apart from those much-debated interests, the general interest which all States have in seeing no one State abnormally expand is evident enough.

The races and religious communities of the East—it is by religion rather than by race that men are united and organized in those countries—are animated by a sentiment which is in some, as among the Mussulmans generally, religious rather than national, and which in others, as with the Bulgarians and Armenians, is now quite as much national as religious. It is in all cases opposed to absorption by any European power.

These races have not behind them the splendid record of great achievements in literature, in art, in government, which in France, Spain, Germany, Italy, and England inspires national feeling. But they have the recollection of a tenacious adherence to their faith and language through centuries of grievous oppression, mingled with the dim traditions of their ancient days of independence, and brightened by the hope of a national life in the future. These aspirations deserve more respect from the western nations than they usually receive, for there is nothing in which men show more want of imagination than in the failure to appreciate under a different exterior the sentiments which they value among themselves.

Apart, however, from the wishes of the several Eastern peoples, apart from those special interests which each of the European States has, or thinks it has, in the settlement of these questions, what is it that ought to be desired by those who, studying the tendencies that have been at work, and the forces that are now at work in moulding the world, seek what will be ultimately the best for progress? What sort of a reconstitution of the East will best serve the common interests of humanity in that future which the evident decay of Mussulman power has for two centuries been preparing?

The most conspicuous feature in the evolution of the modern world has been the effacement of the smaller and the growth of the larger nations and nationalities. The great States have become greater, while the small States have been vanishing. The great languages are covering the world; the minor languages are being forgotten. Only a few types of character, of intellectual life, of social

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THE GREEN MARKET IN STAMBOUL, CONSTANTINOPLE

Photo and copyright by Underwood & Underwood

TO THE DEFENSE OF CONSTANTINOPLE AND THE RELIGION OF THEIR FATHERS

Turkish recruits, reservists, and regular soldiers in a cufa (a type of boat that the ancient Babylonians used) crossing the River Tigris from Bagdad, in the first step of their long journey across 1,200 miles of desert sand, towards Constantinople, to help defend the capital of the Turkish Empire against Christianity in the last stand of the Ottoman in Europe.

organization, each associated with a great nation, are now visible, where formerly there were many.

That any one of these now dominant types will ultimately so prevail against the others as to absorb them cannot be predicted, for at least four or five of the types are immensely strong. Yet, speaking broadly, uniformity tends to increase, variety to disappear. Local patriotism, with all that diversity and play of individuality which local patriotism has evolved, withers silently away. The process is in civilized Europe nearly complete; and the Mediterranean East is almost the only part of the world in which there are left nationalities with the capacity for developing into independent nations that may create new types of character and new forms of literary and artistic life.

Bulgarians, Serbs, Greeks, Armenians—it might seem fanciful to add Albanians and Kurds, yet each of these two small races has a strong individuality and a capacity for greater things than it has hitherto achieved—have in them the makings of nations which might, in a still distant future, hold a worthy place in the commonwealth of peoples. If I were to argue that the small States have in the past done more for the world in the way of intellectual progress than the gigantic States of today are doing, I might be involved in a controversy as to the differences between past and present conditions, and might be told that many of the small States of today, such as most of the republics of Spanish America, make no contribution to the common stock. But without insisting upon such an argument, one may venture to say that humanity has more to expect from the development of new civilized nations out of ancient yet still vigorous races than from the submersion of these races under a flood of Russianizing or Germanizing influences emanating from any one of the three great empires.

The principle of nationalities finds less support and sympathy nowadays, even in countries which, like Germany, have profited by its application, than it did in the past; but those who sympathize with the successful efforts of Italy and Hungary, and the unsuccessful efforts of Poland, not to mention more recent instances, may well extend their sympathies to those nationalities in the East, which, after so long a night, see a glimmer of dawn rising before them.

Failings may indeed be discerned in the men who belong to these nationalities, failings which are the natural result of the conditions under which they have had for centuries to live. But the tenacity with which the Macedonian Christians have clung to their faith when they had so much to gain by renouncing it, the courage which the Armenian Christians showed when thousands of them chose in 1895 to die rather than abjure their Saviour, prove the strength of fibre that is left in these ancient races.

He who, looking above and beyond the dust of current politics, will try to fix his eyes, as Mr. Gladstone did, upon the heights of a more distant landscape, will find reason to think that the development of these nationalities has in it more promise for the future than the extension of the sway of one or two huge military empires, and will believe that to encourage and help them to grow into nations is an aim to which such great and enlightened peoples as those of England, France, and Italy may fitly direct their efforts.

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VIEW OF THE STRAITS OF THE BOSPHORUS AT THE NARROWEST POINT

The foreground is Europe, while Asia is seen across the water. It was at this point that the Persian King, Darius the Great, crossed from Asia to Europe when he attacked the Scythians and Thrace in 512. The castle in the foreground was built by Mohammed the Great during the siege and attack of Constantinople, which resulted in the capture of the city by the Turks in 1453. Another portion of the same fortress, including its largest tower, is shown on page 1146

NATIONAL GEOGRAPHIC SOCIETY

THE program of addresses arranged for this season is given below.

Every lecture is given twice—in the afternoon at 4:45 and in the evening at 8:15—with the exception of the lectures by ex-President Charles W. Eliot and Mr. David Fairchild, on March 7.

In addition to the list of speakers announced, Hon. Charles R. Crane has accepted the invitation of the Society to give an address on "The Balkan States," the date to be announced later. The members of the Society will receive due notice of all changes.

The lectures will be given in the New Masonic Auditorium, Thirteenth street and New York avenue (entrance on New York avenue). All lectures are illustrated with colored lantern slides, and the majority also by motion pictures.

November 15.—"The Blond Eskimo of Coronation Gulf." By Mr. Vilhjalmur Stefansson, of the American Museum of Natural History. Mr. Stefansson, during his four years' exploration (1909-1912) of the Arctic coast of North America, discovered a new tribe of Eskimos, numbering nearly 2,000, who in physical characteristics differ considerably from any Eskimos previously known. Many of them have red hair and blue eyes. Much speculation has been aroused as to the origin of the tribe.

November 22.—"Bulgaria and Servia." By Col. Nox McCain. An intimate description of two small nations whose courage, dash, and achievements have astounded the world.

November 29.—"The Panama Canal, as told in Kinemacolor Motion Pictures." By Rear Admiral Colby M. Chester, U. S. Navy. The Kinemacolor gives the most graphic and realistic picture yet made of the gigantic works at Panama.

December 6.—"The Ascent of Mount McKinley." By Prof. Herschel Parker, of Columbia University, New York. After several expeditions to Mount McKinley and repeated attempts to scale this loftiest mountain of North America, Prof. Herschel Parker attained to within 300 feet of the summit in the summer of 1912. Mount McKinley had been the goal of many mountaineers, all of whom failed to reach a point within thousands of feet of its summit.

December 13.—"The Romance of the Red Indian." By Mr. Walter McClintock.

December 20.—"Modern Greece and Montenegro." By Hon. George Higgins Moses, United States Minister to Greece and Montenegro, 1909-1912.

January 3.—"A Vanishing Empire." By Mr. E. M. Newman. Mr. Newman will tell of Constantinople, Salonica, Adrianople, and the other historic cities which are the center of the present Eastern War.

January 10.—"The Discovery of the South Pole." By Capt. Roald Amundsen, gold medalist of the National Geographic Society. This will be Captain Amundsen's first lecture in the United States.

January 11.—Annual Banquet. At the New Willard.

January 17.—"New Women in China." By Dr. Yamei Kin, the foremost woman physician in China. She is an unusually brilliant speaker and addressed the Society on her last visit to America, in 1911.

January 24.—"Hunting Big Game Across the World, from Borneo to the Rockies, including Central Africa, the British Isles, India, Canada, etc." By Mr. Cherry Kearton, of England. Mr. Kearton shows 3,000 feet of motion picture films of hunting the tiger, elephant, Indian bison, orang-outang, lion, bear, buffalo, elk, etc.

January 31.—"Exploring in the Canadian Rockies and the Capture of Mount Robson, its Highest Peak." By Rev. George Kinney.

February 7.—"Austria-Hungary." By Hon. Bellamy Storer, formerly American Ambassador to Austria-Hungary.

February 14.—"Around the World in Eighty Minutes: A Twenty-five Thousand Mile Tour, told in One Mile of Motion Pictures." By Hon. O. P. Austin, Secretary of the National Geographic Society.

February 21.—"An Explorer's Experiences in Little-known Portions of Korea." By Mr. Roy C. Andrews, of the American Museum of Natural History.

February 28.—Mr. George Kennan will deliver an address to the National Geographic Society on some subject to be announced later.

March 7.—The subject of the afternoon lecture will be "Monsters of our Back Yards." By Mr. David Fairchild, of the Department of Agriculture. Mr. Fairchild will show on lantern slides a marvelous collection of enlarged photographs of locusts, spiders, ants, flies, mosquitoes, caterpillars, etc., all the photographs having been taken by him by a special process.

The address in the evening will be by President Emeritus Charles W. Eliot, of Harvard University, and the subject: "How to Establish a Strong Government in China."

March 14.—"The South Today and Tomorrow." By Mr. Claude N. Bennett.

March 21.—"Gorgeous Siam." By Dr. J. Howard Gore.

March 28.—"Our Pursuit of the Pheasant." By Dr. C. William Beebe, of the New York Zoölogical Park.

April 4.—"The Incas of Peru." By Prof. Hiram Bingham, of Yale University. An account of the results of the Yale-National Geographic Society Expedition to Peru of 1912.

April 11.—"The American Eden." By C. J. Blanchard, of the U. S. Reclamation Service. The glory of our national parks and of the golden west is vividly portrayed in natural colors by the Kinemacolor.

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Photo by Anthony Fiala

THE LURE OF THE FROZEN DESERT

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THE NATIONAL GEOGRAPHIC MAGAZINE

EAST OF THE ADRIATIC

Notes on Dalmatia, Montenegro, Bosnia, and Herzegovina

BY KENNETH MCKENZIE, OF YALE UNIVERSITY

EVERY day steamers leave Trieste and Fiume for the ports on the eastern shore of the Adriatic. The express steamers stop at only four or five of the chief Dalmatian towns, and make the journey to Cattaro in about twenty-four hours. Other steamers touch at many more places, tie up at night, and take three or four days to go the same distance. Other steamers, again, go on to Albania and Greece or across to Italy.

There is probably no region so easily accessible from the beaten track of European travel which offers so much attraction in the way of picturesque old-time life, quaint towns, interesting and beautiful national costumes, and extraordinary scenery as Montenegro and the Adriatic provinces of Austria.

Recent events in Turkey have so absorbed attention that they have crowded out of mind a change in the map of Europe which in the latter part of 1908 almost precipitated a war—namely, the formal and definite annexation by Austria of the Turkish provinces Bosnia and Herzegovina. To be sure, the change was rather in name than in fact; Austria had occupied and administered the provinces, as England has administered Egypt, for thirty years, and it was scarcely conceivable that Turkey would ever regain control of them. Before the Congress of Berlin, in 1878, the provinces had been in a constant condition of turmoil and lawlessness, and hence the powers consented to the military occupation by Austria. In consequence, roads and railways were built, commerce and agriculture developed, and the region became, like Dalmatia, as safe for resident and traveler as any part of Europe.

Some writers maintain that the influence of Austria, outwardly beneficial, has in reality been harmful to Bosnia; however that may be, Austria is now in secure possession not only of the narrow strip of coastland called Dalmatia, a remnant of her Italian history, but of the inland region between Croatia, Hungary, Servia, Montenegro, and Dalmatia.

It remains to be seen whether this political change will make Bosnia and Herzegovina less picturesque and attractive from the traveler's point of view. Probably the large proportion of Mohammedans among the inhabitants will prevent any rapid assimilation to the commonplaceness of more frequented resorts.

The Bosnian Mohammedans call themselves Turks, but in reality they are of Slavic race and language, like the other inhabitants. Various Christian churches—Roman, Russian, Servian—are represented in Bosnia, and a practiced eye can tell the religion of a man or a woman by slight variations in costume. The Mohammedan women usually go veiled; in Herzegovina they wear a heavy cape, with a projection in front of

PERASTO, PERCHED ON A LEDGE AT THE FOOT OF A GREAT MOUNTAIN WALL, IN DALMATIA, 12 MILES FROM THE CAPITAL OF MONTENEGRO

Perasto overlooks the Bocche di Cattaro, a winding and beautiful inlet of the Adriatic Sea (see page 1173), and during the 14th

Photo by Felix J. Koch

A WATER-CARRIER IN HERZEGOVINA

Note that the woman spins as she drives the donkey. The divided skirt originated here

most peculiar form. Croatia and Dalmatia are Roman Catholic, while Montenegro adheres to the Russo-Greek church.

The language of all these regions is the Servian-Croatian. In Dalmatia, Italian is everywhere understood; English, German, or French rarely; while in Bosnia German is serviceable. In Montenegro the sign-language will be found useful, although occasionally a man will be found who speaks Italian or German.

In Montenegro the Russian alphabet is used; in Dalmatia, the Roman, although the language is the same. In Bosnia both alphabets are used side by side, and before the formal annexation, Turkish signs were frequently to be seen; sometimes one name would be repeated in the three alphabets.

The Austrian coinage prevails throughout the region, and the coins of the different countries are interchanged. Each country has, however, its own postage stamps, and those purchased at Fiume, for instance, being Hungarian, are useless in Trieste or Zara. The stamps of Bosnia were among the most beautiful

Photo by Felix J. Koch

THE FALCONERS: IN HERZEGOVINA

The employment of falcons, or hawks, in the chase has from earliest times been a favorite sport of the rich in China, Japan, Persia, India, Egypt, Arabia, and Syria; it is still practiced in Southeastern Europe. The list of quarry includes pheasants, partridges, quails, ducks, woodcocks, gulls, magpies, blackbirds, hares, and rabbits. In Asia, particularly in Mongolia and Chinese Tartary, where the sport still flourishes, hawks are flown at larger game—storks, spoonbills, vultures, and even gazelles being captured by trained falcons. Until the middle of the 17th century

ever issued by any country; they are large, with finely engraved pictures of Bosnian scenes. Those of Montenegro bear a portrait of the prince.

The trip may begin with Dalmatia and its coast towns, then taking Montenegro as a side trip, and ending with Bosnia, whence one goes by rail to Budapest or to Agram and Fiume. Starting from Fiume, one sails down the channel called Quarnerolo, leaving Istria and the Gulf of Quarnero to the right. The island of Arbe, about half way to Zara, has an old cathedral with a twelfth-century tower. Coming from Trieste, one skirts the western shore of Istria, stopping perhaps at Rovigno and at Pola. The stay of an hour enables one to get a hurried glimpse of the great amphitheater and other Roman remains of Pola, now an important naval station and strongly fortified. The language here is chiefly Italian. Istria would well repay the time devoted to a trip of several days; but we pass on, stopping at one or two of the islands, to Zara, the most northerly town of importance in Dalmatia.

Photo by Felix J. Koch

PROMINENT CITIZENS OF ZARA

Zara is noted all over the world for its maraschino. Aside from this, however, the town has many attractions to offer. On landing from the steamer in the landlocked harbor, we find ourselves in front of a gate in the town wall. Over the gate is the winged lion of Saint Mark, often met with here and elsewhere in Dalmatia, and a symbol of the former dominion of the Republic of Venice. Passing through the gate, we enter the narrow paved streets of a typical Italian city, such as we may imagine it to have been two or three centuries ago, except that the hotels are more comfortable. There are a number of medieval churches in the town, interesting architecturally, and containing works of art. The cathedral in particular, a majestic Romanesque church, is richly adorned outside with many arcades of little columns and inside with marbles and paintings. It is in the best Italian style of the Middle Ages. Its campanile is a landmark.

Wandering among the narrow streets, we come upon several open squares and market-places, where in the morning scores of peasants may be seen in their brilliant-colored costumes. There are Roman remains, too—columns and statues. No railroad as yet reaches Zara.

The steamer comes out of the harbor, encircles the point of land on which the city stands, and skirts low-lying shores, passing among innumerable islands. All at once a narrow opening appears; we go through it, and find ourselves in the spacious harbor of Sebenico, with the town rising from the water to a fort crowning the hill. In the middle of the town stands the cathedral, of which we get charming glimpses from the harbor

Photo from "A British Officer in the Balkans." By Major Percy Henderson. J. B. Lippincott Co.

A BOSNIAN TURK AND HIS SON

Turkish boys up to three or four years of age are dressed much in the same way as their sisters, except that their trousers are a little tighter about the ankle and they wear no shawl.

Photo from "A British Officer in the Balkans." By Major Percy Henderson. J. B. Lippincott Co.

SOUTH HERZEGOVINIAN WOMAN AND RAGUSANS

and through the narrow streets. It is a beautiful example of the Venetian gothic of the fifteenth century, richly adorned with carving, and surmounted by an octagonal dome. Here also the streets are filled with strange and brilliant costumes; red is the predominating color. From Sebenico a railroad runs to Spalato, and also into the interior; but it has no connections outside Dalmatia.

The next important station is Trau—important, at least, from the tourist's point of view, for this little town is one of the best worth seeing in all Dalmatia; but commercially the case is different, and only a few of the steamers stop there. We had chosen the *Danubio* partly for the very purpose of seeing Trau, and the time-table gave us a full hour there.

Trau, called by the Romans Tragurium, was a city even before the time of Christ. Later it was one of the strongholds of Venice, as the towers, walls, and public buildings testify. It occupies the entire surface of a small island lying between a larger island, Bua, and the mainland. From every direction it presents a ravishingly picturesque appearance, both for the natural beauty of its situation and for its wonderful architecture. The traveler longs to walk through every street and examine every house, but he must devote special attention to the cathedral, the most interesting church in Dalmatia.

We were examining the quaint sculptures of its portal, when we heard a whistle; but as only a quarter of our hour had elapsed, we paid no attention. A few minutes later, however, our wandering course through the maze of narrow streets brought us unexpectedly back to the broad landing-place, where we saw the *Danubio* calmly sailing off through the raised drawbridge, and headed for Spalato, whose towers we could dimly see ten miles distant across the bay.

We consulted our watches, our time-tables, and some of the natives; but there was no denying the fact that the *Danubio* had left us behind. We knew that she would remain at Spalato until six

A TYPICAL SCENE IN DALMATIA, EAST OF THE ADRIATIC

"We reach the Bocche di Cattaro, an extraordinary fjord, suggesting Norway in its grandeur and the Italian lakes in its luxuriance and its wealth of color. As the boat winds through one narrow channel after another, new arms of water keep opening up, until after a long course, but still quite near the sea, we reach Cattaro, at the head of the fjord" (see page 1173).

A PROSPEROUS GROUP IN CATTARO (SEE PAGE 1165)

"The whole of the Bocche di Cattaro is very strongly fortified. Cattaro itself has had a tumultuous history and many masters. At one time it was a republic, like Ragusa. It is not an interesting town, except for the beauty of its situation and for the varied costumes that

A FAMILY CONSTITUTIONAL

Photos from "A British Officer in the Balkans." By Major Percy Henderson. J. B. Lippincott Co.

TURKISH CHILDREN RETURNING FROM MARKET: RAGUSA

in the morning, and so we prepared to spend the night in catching up with her.

We had observed a plaintive horse drawing an antique carriage, and, thanking our stars that we had not been left on some inaccessible island where no steamer would touch for a week, we set out vaguely for the distant railroad station. The driver thought there might be a train that night, though he could not be sure, and he thought we might catch it. The drive along the shore, among seven little villages called Sette Castelli, is one of the most beautiful in Dalmatia, and this we could appreciate in the twilight. After driving several miles on the main road toward Spalato—the entire distance would have been over twenty miles—we turned inland, and began to climb the foothills toward an apparently impassable wall of mountains. The darkness was now intense as we drove through a thick forest, and no railroad in sight. Finally, however, we drew up at the little station on the mountain side and learned that the train would arrive in a few minutes. After paying for the carriage, we had just enough change in our pockets for third-class tickets to Spalato—and there we arrived about nine o'clock. We tried to walk aboard the *Danubio* as if nothing had happened, but Captain Gopcevich saw us.

"Aren't you the two who were left behind at Trau? Yes? Well, how did you get here? By train? Ah, yes; the train! But I whistled before I started. The time-table? Oh, we never bother about the time-table except when we leave the big ports. Yes, tomorrow morning at six." May this experience warn other travelers to keep an eye on the boat when visiting some too tempting Dalmatian city. Trau can, however, like the Roman city of Salona, be visited by land from Spalato if one has the time to make the excursion. Incidentally, the remarks quoted above were made in Italian, but we afterwards discovered that the captain, an excellent fellow, had been in America and spoke good English.

Spalato, the largest city in Dalmatia, consists of two parts—the old town, built entirely within the walls of the great palace of Diocletian, two hundred yards long and almost as broad, and the new town, stretching to the west along the shore and to the north toward the mountains. In the old town, buildings of Roman, medieval, and modern times are inextricably mingled. The streets are mere tunnels, and to walk through them at night is a weird experience. In the middle is the cathedral into which the mausoleum of the emperor has been transformed. The new quarters of the town are spacious, and of course comparatively commonplace, but the old town is unique.

From Spalato to Gravosa the express steamers go in seven hours, but the *Dan-*

Photo from "A British Officer in the Balkans." By Major Percy Henderson. J. B. Lippincott Co.

A RAGUSAN WOMAN AND LOAD

Photo by Emma G. Cummings

A TURK ON THE MAIN THOROUGHFARE: MOSTAR (SEE PAGE 1185)

Photo from "A British Officer in the Balkans." By Major Percy Henderson. J. B. Lippincott Co.

CANALESI WOMEN IN NATIONAL DRESS

ubio took two days to cover the distance, stopping at many ports on the islands that lie off this part of the coast. The most interesting of these islands are Lesina, Lissa, and Curzola. Lissa has given its name to two famous naval battles—one between the English and the French in 1811, and one between the Austrians and the Italians in 1866. The two harbors of the island, Lissa and Comisa, are exceedingly beautiful. The chief source of income in this part of Dalmatia is from the sea, and the costumes of the fishermen are less picturesque than those of the islanders who come to the coast towns on the mainland. In architectural beauty Curzola is particularly striking; it is a diminutive walled city on a point of land which juts out from the large island of the same name into the channel which separates it from the mainland. Opposite, the mountains rise

Photo from "A British Officer in the Balkans." By Major Percy Henderson. J. B. Lippincott Co.

A BOSNIAN BEAUTY

As a rule the Bosnian women are not handsome, but this one had skin like a peach, features of a Greek statue, and smiling brown eyes. She wore a diadem of gold coins, a row of flowers above, and a snow-white veil reaching to her feet.

Photo from "A British Officer in the Balkans." By Major Percy Henderson. J. B. Lippincott Co.

A UNIQUE COSTUME IN JAJCE, BOSNIA: A BREASTPLATE OF COINS

directly from the sea, with a few villages here and there along the shore.

Gravosa is the harbor of Ragusa, the great show place of Dalmatia, and surely one of the most lovely places in Europe. The road between the two runs through gardens, with glimpses of the sea. Ragusa also has a little harbor of its own, where small boats land. Here one may find a launch or a rowboat to cross to the island of Lacroma, to sail around the promontory to Gravosa, and to ascend the Ombla River, which issues in a mighty stream from the foot of a mountain. The palaces, churches, cloisters, and gates of Ragusa, while they may be seen in a few hours, leave on the mind a lasting impression of beauty.

We made the excursion to Lacroma in company with a Hungarian artist, who

Photo from "A British Officer in the Balkans." By Major Percy Henderson. J. B. Lippincott Co.

MANGERS AS CRADLES

Amongst the Bosnian peasantry, mangers or wooden troughs for animals to eat out of are in general use as cradles. This woman is carrying her baby in this way

VILLAGE SCENE AT NJEGUS, MONTENEGRO

Photo by Kenneth McKenzie

MARKET DAY AT NJEGUS, MONTENEGRO (SEE PAGE 1175)

Photo by Kenneth McKenzie

MARKET DAY AT NJEGUS, MONTENEGRO

took pains to inform us that he was a "Kunstmaler" and a pupil of the great Arnold Böcklin. The trip was to him almost a pilgrimage, for one of Böcklin's most famous pictures, "The Isle of the Dead," was inspired by the rocks and trees of Lacroma. The view of the city, with its walls rising directly from the water, is particularly striking from this point. In the market-place, especially in the early morning, the wealth and variety of national costumes is greater than elsewhere in Dalmatia.

Before taking the train from Gravosa for the interior, we continued by steamer to the south in order to visit Cattaro and Montenegro. There are no harbors until we reach the Bocche di Cattaro, an extraordinary fjord, suggesting Norway in its grandeur and the Italian lakes in its luxuriance and its wealth of color. As the boat winds through one narrow channel after another, new arms of water keep opening up, until after a long course, but still quite near the sea, we reach Cattaro, at the head of the fjord.

For some time, on the sides of the precipitous mountains rising behind the town, the zigzags of the road to Montenegro have been visible—the one easy means of entering the principality. First the road takes a long turn to the south, three miles in a direct line from Cattaro—much more as the carriage goes; then it returns, mounting in numberless windings, until it reaches an altitude of some 3,000 feet and is directly over the starting point, where the steamer can be seen still moored to the pier. The view over the various arms of the gulfs, with their many villages, over the surrounding mountains, and in the distance the Adriatic, is indescribably grand. The whole of the Bocche di Cattaro is very strongly fortified. Cattaro itself has had a tumultuous history and many masters. At one time it was a republic, like Ragusa. It is not an interesting town, except for the beauty of its situation and for the varied costumes that one sees.

Soon after passing the frontier of Montenegro the road turns inland, and as we descend into the valley of Njegus

Photos by Kenneth McKenzie

MONTENEGRIN GENTLEMEN

BLIND BEGGAR AT NJEGUS, MONTENEGRO

we find ourselves in a different world. The entire country seems to be one enormous gray rock, cut into the most fantastic peaks and ridges, with here and there a patch of green. Wherever there is a depression or a level to hold a little soil, there is a farm, with grain and vegetables growing, and here and there are clumps of trees. The houses are of blocks of stone, small and plain. The people, on the other hand, as many travelers have testified, are magnificently handsome and strong. All, rich and poor, from the prince down, wear the national costume. As a rule, they pay no attention to the traveler.

MONTENEGRIN BOYS

It was market day when we drove through the village of Njegus, and peasants were gathered there with their cattle and sheep. Some young men were bowling in the village square, just as they might have done in France or Italy. Several magnates, armed to the teeth, were taking coffee on the terrace of the Hotel Njegus—a house where the traveler will probably stop for lunch and where the night could be spent. The road now mounts again, and as it leaves the valley of Njegus for that of Cettinnje it attains a height of over 4,000 feet.

The view at this point is not only overwhelmingly grand from its great extent, but is also unique in character. In the distance one can see the lake of Scutari, as our Italian-speaking driver calls it, and here and there a little green between the crags, but in the main, so far as the eye can reach in every direction, there is nothing to be seen except absolutely bare rocky crags of a uniform gray color, rising in range after range like enormous waves on a stormy sea. Then one understands the name of the country—Black Mountain. We pass a few shepherds and goatherds with their flocks, which somehow get a living among the rocks. More vegetation appears as we descend rapidly to the broad, level valley of Cettinnje, which is about 2,000 feet above sea-level.

The road is excellent, although in places narrow, and our carriage rolled along smoothly enough. All at once, however, the driver discovered that one of the horses had a loose shoe. After futile attempts to have the damage repaired at several farm houses, he adopted a novel device: he took a bag which had held fodder and tied it tightly over the horse's hoof, loose shoe and all. The horse, after his first surprise, trotted along contentedly; but the repairs were evidently of only temporary effect. A passing teamster, however, was able to attend to the matter properly, in the mid-

Photo and copyright by Underwood & Underwood

MONTENEGRIN ARTILLERY: NOTE THE NATIONAL COSTUME

dle of the road, on top of the mountain, with nails, hammer, and a new horseshoe, for which service he was sufficiently paid, it seemed, with four cents. We were glad that we could enter the town in good style, for as we approached we met a carriage containing His Highness Prince Nicholas and the princess, his wife. They were dressed in the national costume and enjoying their afternoon drive. A few minutes later we passed one of the young princes. The drive of eight hours ends at the Grand Hotel.

The capital of Montenegro consists of one broad street, flanked by houses one or two stories in height, and three or four side streets. The hotel is at the end of the main street, and beyond it the road continues, first through a simple park, then over a pass to the Lake of Scutari, to Antivari, the port of Montenegro on the Adriatic, and to Albania. At the right of the main street are the palace of the prince, impressive only by contrast with the rest of the town, but surrounded by a charming garden, the few government buildings, and a monastery-church containing the graves of former rulers. The finest buildings in the town are the legations of Austria, Russia, and Italy. Each of these countries desires to have the preponderating influence, and each would probably try to gain possession of the principality if an opportunity should offer. The sights of the town and the modest shops are soon seen, but the traveler will not soon tire of looking at the

Photo by Emma G. Cummings

TURKISH HOUSES: JAJCE (SEE PAGE 1185)

Jajce is considered one of the most interesting towns in Bosnia. It was formerly the home of the Bosnian kings

Photos from "A British Officer in the Balkans." By Major Percy Henderson. J. B. Lippincott Co.

CURIOUS HEAD-DRESSES: JEZERO

A cross between a bishop's mitre and an inverted flower-pot (see page 1183)

SHEEPSKIN COATS, SEEN IN BOSNIA, NEAR JEZERO

These are of undressed skins and are similar to the poshteen of Northern India. In the summer they are worn with the leather inside and the fur outside, and this is reversed in the winter.

A RURAL SCENE IN BOSNIA, AUSTRIA-HUNGARY

Photo by D. W. and A. S. Iddings. Copyright by Keystone View Co.

NATIVE MOSLEM BOYS IN NARENTA GORGE, NEAR HERZEGOVINA, AUSTRIA-HUNGARY

Photo by Felix J. Koch

RAISING THE OPIUM POPPY IN BOSNIA

Photo by Felix J. Koch

TURKISH PILGRIMS AT THE SACRED ROCK, NEAR BUGOJNO, IN BOSNIA

"Germans who have lived among them speak in the highest terms of the Bosnian Turks. They are excellent craftsmen, and Oriental rugs, embroideries, brass, copper, and silver work, and fabrics, all of Turkish or Arabic style, but of local workmanship, can be found in the shops" (see page 1185).

KONJICA, IN BOSNIA, 40 MILES FROM THE MONTENEGRIN FRONTIER

"Throughout the provinces the most striking architectural feature is the slender white minarets of numerous mosques. Cypress trees have been planted around the mosques either with the perfection of art or with a most happy instinct for effect, and the varied groupings of the slender dark green trees, with the domes and minarets, are ravishingly beautiful" (see page 1175)

JEZERO: AUSTRIA-HUNGARY

Jezero, sometimes called the Bosnian Venice, is a charming little village in a grove of trees at the head of a small lake. It lies embosomed in hills whose sides, sloping down sharply to the lake, are covered with luxuriant walnut and fruit trees

Photo by D. W. Iddings. Copyright by Keystone View Co.

VEILED MOHAMMEDAN WOMAN: MOSTAR, HERZEGOVINA

handsome people and their really beautiful costumes.

The drive back to Cattaro offers no especial novelty as compared with the drive in the other direction, but the effect of the view over the different arms of the Bocche di Cattaro, as it suddenly comes into sight from an altitude of 3,000 feet, is indescribable. At this moment we also saw our steamer slowly approaching the pier, and our progress down to sea-level was a race with time. We drove up to the gang-plank just in time to scramble aboard, and after a sail of four hours we were once more in Ragusa.

There is also a railroad, running partly in Dalmatian and partly in Herzegovinian territory, from the Bocche to Gravosa, and then into the interior. Leaving Gra-

vosa, the train passes along the picturesque River Ombla, mounting rapidly, and soon crossing the frontier of Herzegovina. The scenery for the most part is arid and desolate; sometimes there are flourishing fields of wheat or tobacco, enclosed by bare mountains; at other times not a vestige of vegetation is to be seen. On reaching the River Narenta the road turns to the northeast, and follows the river as far as Mostar, the capital of Herzegovina.

Mostar is a thriving town, built on both sides of the river, and shut in by bare hills. The chief sight in the town is a famous stone bridge, crossing the river with a single lofty span of about a hundred feet in width. The bridge has been called Roman, but more probably it was built by the Turks in the middle ages. The town itself has a Mohammedan quarter, with the usual characteristics familiar in the Orient, and a European quarter, Austrian in character. Here, as at all the chief places in Bosnia, are excellent hotels belonging to the government.

The Mohammedan women of Herzegovina wear a remarkable hood; otherwise all the peculiarities of costume seen here will be found again in greater profusion at Sarajevo, the capital of Bosnia.

Throughout the provinces the most striking architectural feature is the slender white minarets of numerous mosques. Cypress trees have been planted around the mosques either with the perfection of art or with a most happy instinct for effect, and the varied groupings of the slender dark green trees with the domes and minarets are ravishingly beautiful. The court-yards of the mosques, with the prescribed fountains and the interior decorations, are also extremely attractive. The houses are small, usually with steep thatched roofs.

The people are generally indifferent, but courteous. Germans who have lived among them speak in the highest terms of the Bosnian Turks. They are excellent craftsmen, and Oriental rugs, embroideries, brass, copper, and silver work, and fabrics, all of Turkish or Arabic style, but of local workmanship, can be found in the shops. The chief resource of the provinces at present is agriculture. It is curious to see Turks in heavy turbans, baggy trousers, and flowing robes gathering hay or grain in the fields, and the first thought of the traveler is that those costumes, beautiful as they are, must be hot and uncomfortable under the summer sun.

The railroad is narrow-gauge, and at times fitted with the cog-wheel system where the grade is steep. Our observation and experience led us to prefer third class, where our fellow-travelers were the people of the country, invariably clean and perfectly polite. First class was expensive, and nobody used it; second class was patronized chiefly by German commercial travelers, and fourth class, otherwise quite possible, had no seats in the cars. The road from Mostar to Sarajevo follows the Narenta, which flows through a rocky gorge for many miles. At one point a powerful waterfall bursts directly out of the face of the cliff on the opposite side of the gorge. At other places the banks are soft, and the river has undermined them.

Sarajevo is splendidly situated in a basin of mountains, with the river rushing through the middle of the city. Its bazaar affords a satisfactory view of Oriental life, while the well-paved streets and substantial buildings of the European quarter suggest comfort and wealth. The churches and mosques, the museum of national costumes, and the hills around the city offer varied interests, but most travelers will be chiefly fascinated by the Mohammedan quarter.

From Sarajevo the railroad goes north to Hungary, joining the main lines of travel. The interesting way to leave Bosnia, however, is to take the branch line to Jajce, thence drive by stage over an excellent road in eight hours to Banjaluka, and there take the train for Agram, on the line from Budapest to Fiume.

Jajce affords the most beautiful scenery that can be imagined. The town rises steeply from the river to the top of a hill crowned by an old Turkish fort, the pointed roofs of the houses are half hidden in trees, and beyond are mountains. Around one side of the town flows a stream that plunges over the lofty bank

Photo by Emma G. Cummings

MARKET PLACE IN AGRAM, CROATIA, AUSTRIA-HUNGARY

Photo by Emma G. Cummings

CROATIAN CHILDREN RETURNING FROM SCHOOL: AUSTRIA-HUNGARY

Men, women, and children dress mainly in white

into the river, making one of the finest waterfalls in Europe. The drive to Banjaluka is through a richly cultivated but comparatively commonplace section, but the town offers beautiful views and several interesting buildings. The costumes here are different from those already seen, but no less elaborate.

We are near the borders of Croatia, and the Austrian military railroad, so called, brings us in three or four hours to Agram, the ancient Croatian capital, under the crown of Hungary. The trip as we have described it gives a vivid idea of the great variety in land and people of what is only a small part of the dominions of Emperor Francis Joseph.

Photo by Emma G. Cummings

CROATIAN CHILDREN RETURNING FROM SCHOOL, NEAR AGRAM

Photo from "A British Officer in the Balkans." By Major Percy Henderson. J. B. Lippincott Co.

DANCING THE CSARDAS

The national dance is graceful and fascinating when well performed. Each dance is kept up for about twenty minutes, and goes on for hours with short intervals

THE LAND OF CONTRAST: AUSTRIA-HUNGARY

By D. W. and A. S. Iddings

THE name "Œsterreich," or "Austria," literally means "Kingdom of the East," or "Eastern Country," from its position relative to the rest of the old Germanic Empire.

It occurs for the first time in history in 996, in a document signed by Emperor Otho III, the last of the Saxon dynasty of the "Holy Roman Empire of the German nation." At that time it was a frontier district and served as a buffer land between the Western Empire, as the "Holy Roman Empire" was then sometimes known, and Hungary, an unchristian nation only begun to be proselyted.

In spite of its important position, both geographically and politically, but few people realize exactly what they mean when they speak of Austria-Hungary, and to many the words Austria and Hungary seem interchangeable terms for the same country. What, then, is Austria, what is Hungary, and why are they always bracketed together?

The Austrian Empire is a constitutional monarchy formed of three kingdoms, Bohemia, Galicia, and Dalmatia, two archduchies, Upper and Lower Austria, and a collection of duchies, countships, and margravates of princely rank; all of them united in the person of the Emperor Francis Joseph.

No country in Europe, except only Hungary, contains within its borders so many diverse nations and tongues as the Austrian Empire. Each of the three great ethnic stocks of Europe is represented—the Latin, the German, and the Slav. The Slav is the dominant race, as to it belong 15 out of the 26 million people inhabiting the Empire; yet, owing to division into a number of peoples differing from each other in language, tradition, and culture, this race has to yield place to the German minority, which is a compact integral body animated by the same tradition, religion, and political aims. This minority, however, has a relative majority over the other peoples of Austria, as more than 9 million speak the German language, while its next competitor, Polish, is used by but 4 million of the people. Moreover, the Germans, both historically and intellectually, have contributed more to the Empire than any other of its varied nations, and they feel, not without justice, that they are entitled to the favored position which they hold.

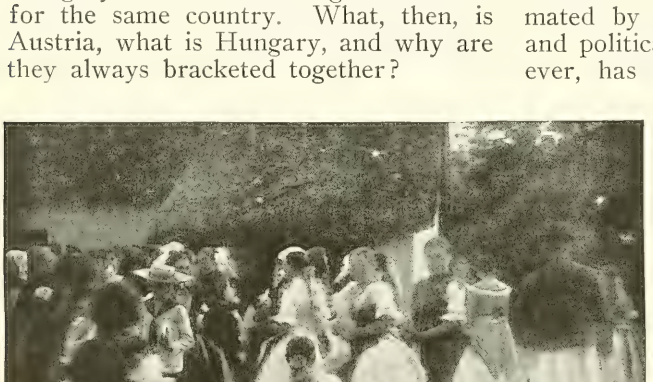


Photo from "A British Officer in the Balkans." By Major Percy Henderson. J. B. Lippincott Co.

VILLAGE HEIRESSES IN CROATIA, AUSTRIA-HUNGARY

It is the fashion at fêtes for the unmarried girls to dress in as many petticoats as possible, even as many as twelve, one over the other, with the result that they present the appearance of inflated balloons. When a girl wishes to sit down, she must subside on to the ground in a squatting position, producing that elegant effect known to school girls as "making a cheese."

THE HUN IS PERHAPS THE KEENEST PATRIOT IN EUROPE

In the adjacent and entirely independent Kingdom of Hungary a somewhat similar state of things exists. The Hungarians, or, more properly, the Mag-

yars, number very little more than half the total population, yet in wealth, position, and influence they enjoy the first place in the "realm of the crown of St. Stephen," as the country is officially known.

In addition to Hungary proper, St. Stephen's realm includes Croatia, Slavonia, and Transylvania, countries formerly independent, but now, through intermarriage, conquest, and inheritance, all possessions of the Apostolic King of Hungary, who happens by a purely historic chance to be also sovereign of the Empire of Austria.

The possession of a unifying link in the person of their common ruler has led to the Ausgleich, or "Compromise," whereby the two countries, for mutual convenience, have agreed to join forces in maintaining joint diplomatic and naval and military services. Beyond this the two countries are entirely independent, each having its own constitution, legislature, and administration.

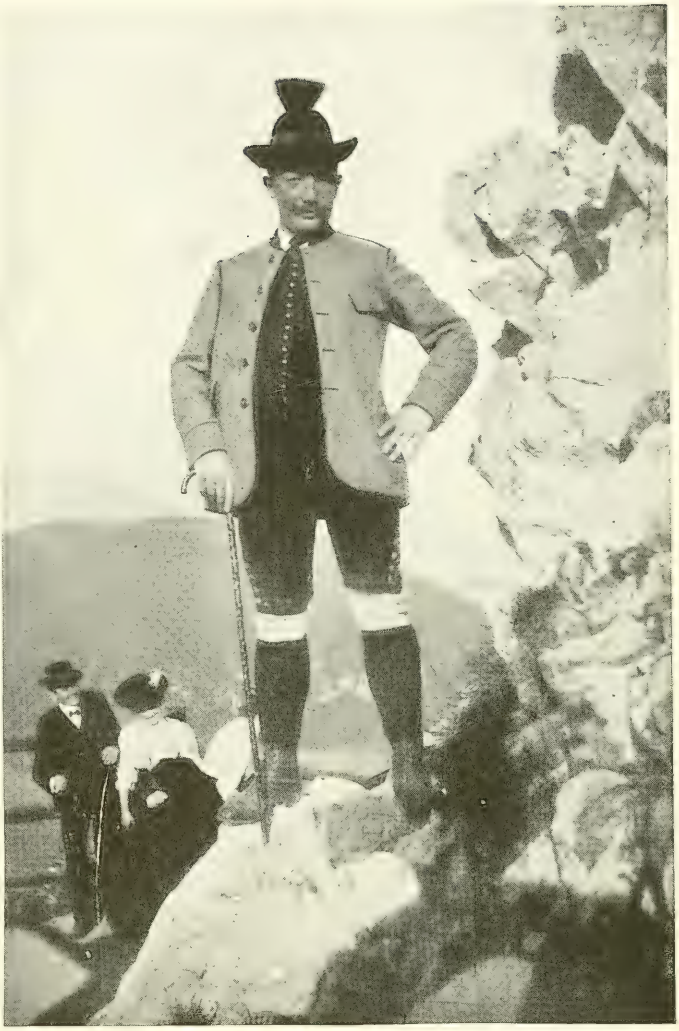


Photo by Marie Helms

THE COSTUME OF A MAN FROM STEIERMARK, AUSTRIA (GRAY AND GREEN)

Notice the chamois tail in his hat

The Magyar is perhaps the keenest patriot in Europe, and he manifests his enthusiasm by seeking to impose his language and customs upon his Slavonic fellow-citizens with a persistence that neither opposition nor passive resistance can diminish. The ideal of the Hungarian statesman is the "Magyarization" of the entire country, and, while a certain measure of success is undoubtedly being obtained, the land is losing the flower of its young manhood by the constant drain of emigration, usually to the United States. In an agricultural State, as is Hungary, where three-fifths of its inhabitants gain their living from the soil, this constitutes a grave danger; but the Slovaks, Ruthenians, Croatians, and Poles, with the stolid obstinancy of the Slav, prefer exile to the loss of their language and national sentiment.

In these lands, so mixed in nationality and language, there is, naturally, no less a variety in religion; Roman Catholics preponderate, but Greek Orthodox, Uniat Greeks, Lutherans, Calvinists, Jews, and even Armenian Gregorians, are found within their borders. It is not too much to say that Austria-Hungary is a frontier Christian State. Beyond her confines in her little Balkan

Photo and copyright by G. R. Ballance

A CALVARY AT BOZEN, TYROL

There is a profusion of nice walks amid novel and truly beautiful scenery round Bozen, and the archæologist can visit a great number of interesting castles and churches, some in ruins, others in semi-habitable condition.

neighbors of Servia, Bulgaria, Roumania, and Greece there is a blending of the Eastern and Western civilizations and religions, finally fading into the pronounced Eastern type in Turkey herself, the last real remnant of Asiatic influences in Europe.

AUSTRIA IS INDUSTRIAL, HUNGARY AGRICULTURAL

The customs-union between Austria and Hungary has rendered these countries a commercial unit; but, roughly speaking, Hungary is the agricultural and pastoral country, while Austria is industrial.

The great Hungarian plains, with their rich pasturage, produce magnificent cattle and yield great quantities of cereals of every variety, and in both there is an important export trade. Hungary is also the richest country in Europe in mineral deposits, the range of which is singularly wide; gold, silver, and opals are found; the most precious but the least important, more prosaic but of infinitely greater value, are the coal and iron deposits, while the salt mines in Transylvania—a government monopoly — are famous throughout the world.

The industrial life of Hungary is still in its infancy, as the Magyar government did not realize the value of native manufactures till a few years ago; recently it has been exerting strenuous efforts in this direction and, taking adverse conditions into account, has so far been very successful. Flourishing mills have sprung up all over the country, the flour they produce forming the principal article of export.

Austria, while by no means lacking in the production of raw materials, bulks larger as an industrial power. Her glass, especially the Bothemian glass, is in great demand the world over, and her fancy goods—the Vienna novelty—yield a large revenue. Austria manufactures the raw iron that Hungary produces and does a considerable trade in ironware, especially with India and the East.

Photo and copyright by G. R. Ballance

LANGKOFEL FROM SEISER ALP: TYROL

THE WONDERLAND OF EUROPE

The dual monarchy, and particularly Austria, could derive a considerable revenue from the tourist traffic. The charm of some of the old towns, as, for example, Prague, is very great, the mineral springs of which are numerous and valuable, but two only—Carlsbad and Marienbad—are well known. The Dalmatian coast rivals the Riviera both in climate and beauty, and the mountains alone could form a very considerable attraction.

That Austria is, after Switzerland, the most mountainous region in Europe, and that more than four-fifths of her vast territory is over 600 feet above the level of the sea, is no doubt news to the majority of people.

To the popular mind, that vast range of mountains which overruns a large portion of southwestern Europe and to which the name Alps has been given, suggests Switzerland, little Switzerland, and nothing more. And yet there are Italian, French, German, and Austrian Alps as well, so great is the extent of the range.

The reason for this general misapprehension seems to be that Switzerland has for years advertised, if we may use the word, her mountains for the pleasure of outsiders and has made a great resort of them, whereas Austria, for instance, has used her mountains for the enjoyment of her own people—and the Austrians certainly do enjoy them.

Mountain-climbing is their great national game, like baseball among us. Old, young, middle-aged, all take a keen interest in it. And even Emperor Francis Joseph himself is an enthusiastic mountaineer at more than 80 years of age. In his time it is said he has scaled most of the great peaks of his country.

THE DOLOMITES

There are five central points in the Austrian Alps from which the several sections of that vast mountain region are accessible. Innsbruck for the Tyrol and Vorarlberg, Salzburg for the Salzburger Alps and the Salzkammergut, Bozen for the Dolomites and South Tyrol, Villach

Photo and copyright by G. R. Ballance

THE VAJOLET TOWERS: TYROL

"The Dolomites stand in a class entirely by themselves, their tall spire-like peaks of bare brown-red rock matching neither the green slopes nor the snow-white peaks of the other mountains" (see page 1200).

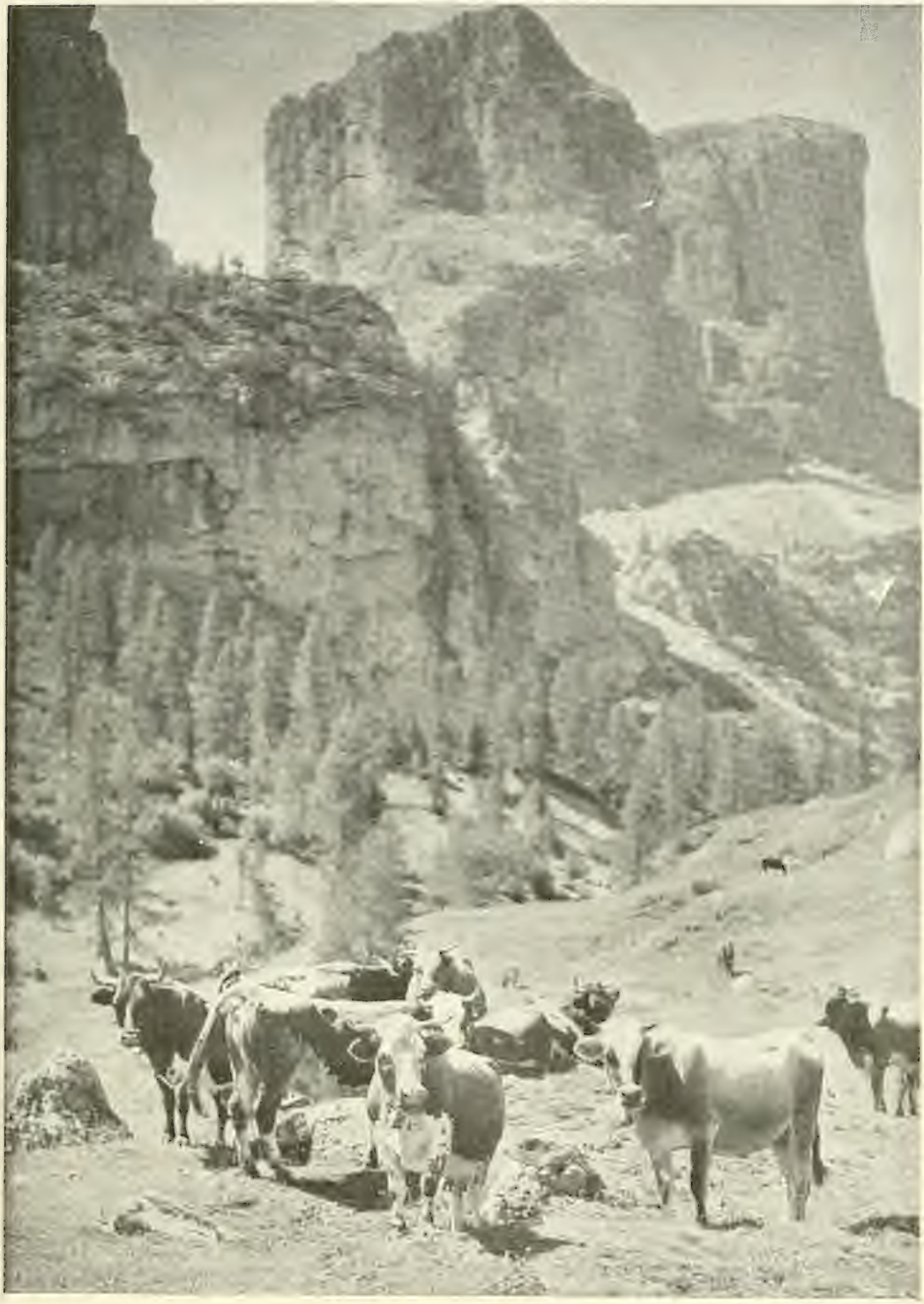
Photo and copyright by G. R. Ballance

AMONG THE DOLOMITES: TYROL

"Until recently the heart of the Dolomite region was pretty much shut off from the traveling public owing to the difficulty of its means of communication with the outer world, but this has all been remedied, and now an ingeniously constructed highroad penetrates it from Bozen, and one may travel the whole way in a government mail motor, although perhaps the best way to make the trip is on foot" (see page 1200).

SELLAJOCH, IN THE TYROL

Nature seems to have delighted to treat this, the most exclusively mountainous country in Europe, as a football for experimental kicks. In few territories on the face of the globe have rivers cut deeper gorges, have titanic mountains been piled up into more bizarre shapes unlike any other peaks—the unique Dolomites, with their wonderful spires and pinnacles, being an instance. Nowhere else have moraines, landslips, freshets, vast inundations, and terrible earthquakes tested more frequently, and in many cases ruthlessly destroyed, man's handiwork.—W. A. Baillie-Grohman.



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CATTLE ON THE GRODNER JOCH, TYROL

Photo and copyright by Donald McLeish

A WAYSIDE CROSS: TYROL

No other country of its (Tyrol) size, it is safe to say, has in the course of the last twenty centuries witnessed such grim fighting; no other pigmy territory has been swept, partly in consequence of its geographical position, by vaster movements of marauding hordes, or has been turned into a mediæval cock-pit oftener and more ruthlessly. Nowhere on the globe do we find within such a limited area a more varied agglomeration of the remnants of conquering races who, when each in its turn went under, sought and found a last sanctuary in the inaccessible alpine fastnesses of the "Land in the Mountains," the refugees being naturally the fittest of their kind to survive.—W. A. Baillie-Grohman.

A PALATIAL HOTEL IN THE TYROL (5,266 FEET)

Among these upheaved races were the Austrasian Franks from the lower Rhine, the Lombards from the Po country, the Sclavic Wends from Lusatia, the Marcomanni, the Alimanni, the Goths, the Vandals, the Burgundians, the Suevians, and the Baiuvarii. They all left their racial impress upon their progeny, and to this day it is possible to trace the origin of the larger part of Tyrol's population by the language, physical appearance, mental idiosyncrasies, costume, or ancient customs and institutions, as well as by folk-lore.—W. A. BAILLIE-GROHMAN.

Photo and copyright by Donald McLeish

A TYROLESE PASTURAGE

The game played by the Tyrolese peasant, his wife and children, from their tenderest years upwards, six days out of seven is a hard one beyond description. The soil is poor, the little patch of arable land is situated on a slope steep as a church-roof, and the necessary manure has to be carried up in baskets, mostly on women's shoulders, for the men are away doing yet harder jobs; the climate is rough, hardly a month without frost, and seven months of deep snow, which in some years falls to an incredible depth. Last winter, according to official sources, 21 feet of snow fell in the valley of Brandenberg, and the houses were buried up to the first-floor windows. Sparse crops of rye and oats are all he can raise beyond his dairy produce wherewith to feed himself and his offspring.—W. A. Baillie-Grohman.

Photo and copyright by Donald McLeish

BRINGING HOME THE STRAYED LAMB: TYROL

The hardships of his daily life have steeled his fibre, and his courage, as well as his fearlessness of pain, is extraordinary, as the following instance may go to prove. Not long ago a young peasant of the Zillerthal, by occupation a wood-cutter, had his leg crushed to pulp by a falling tree. His single companion rushed down the mountain-side to fetch the distant doctor. When the latter arrived, after many hours, he found that the injured man had cut off the crushed part by severing the ligaments with his pocket-knife; and, tying his braces tightly round to stop the hemorrhage, had actually hobbled some distance down the path to meet him, though by that time night had fallen. The doctor saw that it would be necessary to amputate what remained of the stump higher up, and he did it there and then, the man lying on the ground propped against a tree, and holding during the operation the lantern, the other man having gone off to fetch some men with a litter.—W. A. Baillie-Grohman.

Photo and copyright by G. R. Ballance

A BIT OF OLD SALZBURG: AUSTRIA

for the Tauern Mountains and Carinthia, and Graz for the mountains of Styria.

The chief differences between the mountains of these several sections, excepting the Dolomites, which are of an entirely distinct formation, are attributable to climatic conditions. Thus the slopes of the South Tyrol, warmed by the soft winds from the Adriatic, are for the most part wooded and green, giving way to snow only when a very high altitude is reached, while farther north in the fastnesses of the Vorarlberg, North Tyrol, and Tauern Mountains there is much of snow and ice the year round.

The Dolomites stand in a class entirely by themselves, their tall spire-like peaks of bare brown-red rock matching neither the green slopes nor the snow-white peaks of the other mountains. Until recently the heart of the Dolomite region was pretty much shut off from the travelling public

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SHRINE AT ST. MAGDALENA: TYROL

owing to the difficulty of its means of communication with the outer world, but this has all been remedied, and now an ingeniously constructed highroad penetrates it from Bozen, and one may travel the whole way in a government mail motor, although perhaps the best way to make the trip is on foot. Stopping places are frequent and the journey may be often broken over a mug of beer and a slice of good cheese, as some grotesque formation of the rock or inspiring landscape holds the rapt attention.

The Carpathian Mountains form the watershed between the Northern Seas and the Black Sea. They are almost wholly in Austrian territory, extending from the valley of the Danube River, which separates them from the Alps, to the frontier of Roumania. To the main chain of the Carpathians the name Western Carpathian Mountains has been given.

THE VILLAGE OF TRAUNKIRCHEN AND SPITZELSTEIN PEAK: SALZKAMMERGUT, NEAR SALZBURG

This division includes the Tatra Mountains of southern Galicia and northern Hungary. These splendid mountains, though of far less mean altitude, are in no wise second in grandeur of scenery to the Alps or other far-famed mountain regions. The Tatra Mountains, or High Tatra, as they are commonly called, are noted for the magnificent beauty of their mountain lakes, found in great frequency nestling in deep hollows between the steep and jagged granite peaks. To these little bodies of clear cold glacial water, held in Nature's palm away up among the clouds, the significant name "eyes of the sea" has been given.

The Tatra Mountains are deeply forested with gigantic firs. Through their almost virgin wilderness well-built stage roads lead by easy grades to the centers of population and points of particular interest. On these highways the chief traffic is carried on in crude native wagons, of which the furka, a wicker basket body set without springs upon a wooden bed of the simplest design, is used for passengers.

BOHEMIA AND PRAGUE

Bohemia (German Bohmen, a perversion of Boheim) derives its name from the Boii, a race of Celts, whose occupation dates back many centuries. They were driven out by a savage horde called the Marcomanni, whom the Slavonic race in turn expelled. The Slavonic peoples still predominate in Bohemia, although there are certain vast and prosperous sections, largely under the influence of the German Austrians as distinguished from the Czechish or Bohemian, which make up what is called Deutsch Bohmen, German Bohemia.

Bohemia's beautiful capital and chief city, Prague, is the second city of Austria. It is splendidly located on both banks of the Moldau River, and lies about 150 miles northwest of Vienna. The city dates back to the ninth century, when it is supposed to have been founded by the Princess Libussa. Like all mediæval cities, it was once surrounded by walls but few traces of which now remain, busy and beautiful streets having taken their places, just as the Rings have been built on the site of the old walls of Vienna. Enough of the old walls and bastions of Prague still stand, however, to give an idea of their architecture and extent.

But Bohemia is perhaps best known for her baths, the most noted of which, Carlsbad, is four hours from Prague by rail.

Perhaps no better testimonial to the efficacy of the Carlsbad waters needs be offered than is to be found in the fact that over 65,000 ailing people visit the springs annually to take the cure by drinking and bathing, not to mention over 170,000 casual visitors and tourists.

GALICIA, WHERE THE POLES LIVE

Galicia and the Bukowina, the extreme northeast provinces of the Austrian Empire, are bounded on the south by Hungary and Transylvania and on the north by Russia. Many mountains and great forests overrun the region, which is one of the wildest in Europe. Here a primitive people, descendants of the proud Polish Kings, live a decadent, backward existence, pursuing farming and herding for a scant livelihood.

They clothe themselves in suits of blanketing and furs, fashioned at home, with which to withstand the long and rigorous winters. They wear their hair long, live in rude slab board and log huts, and altogether strangely resemble the North American Indian in his semi-civilized life today in the American Northwest.

By one of those curious anomalies of which the Austrian Empire is full, Galicia, which has the most backward people, enjoys a larger measure of self-government than any province of the Empire, being practically autonomous. This is the more extraordinary when it is recognized that nearly half the inhabitants are Poles—members of a nation who have steadily refused to be governed by outsiders and yet absolutely incapable of governing themselves. Perhaps the governmental success of Galicia is due to the fact that the Poles have found a rallying point in opposition to their Ruthenian neighbors, who are in everyway their opposites.

ONE OF THE MAIN STREETS OF INNSBRUCK, TYROL

Its position on a wide plain, surrounded on all sides by sheltering peaks, with the silver band of the Inn winding along the green and extremely fertile valley, is one of the most picturesque in Europe.

Galicia is also the Jewish stronghold of the Empire and the business of the entire province is in their hands, and they maintain a valuable transient trade to Russia and the East. The chief industry of the province is distilling, Galicia supplying 45 per cent of all the spirits used in the Empire. Outside this the production of the province is confined to peasant household industries, as cloth and linen weaving.

Education in Austria is compulsory, and all children must attend the "Volksschulen" (schools for the people, or elementary schools) from the end of their sixth year until the end of their twelfth or fourteenth year, varying in the different provinces.

Although education is compulsory, it is only so where schools have been established, and there are as yet few schools in Galicia and the Bukowina. Hence in the Bukowina only about 34 per cent of the children are now in attendance in the public schools, and in Galicia only about 59 per cent. The large mass of the people are illiterate.

VIENNA—A MODEL MODERN CITY

Vienna, the Imperial City, the capital of Austria, had a great Burghermeister in Dr. Karl Lueger, lately deceased. Under Lueger Vienna became a city of municipal ownership. She owns her own electric and gas light, street railways and omnibuses, ice manufacturing plant, warehouses, stock yards, brewery, wine cellar (the celebrated Rathaus-Keller), all the pawnshops and even the undertaking establishments.

Quite in harmony with the history of Vienna—really a series of sieges from the earliest to modern times—were the splendid fortifications she possessed. The inner city was protected by a rampart, fosse, and glacis, while a series of external fortifications marked and defended the outer boundaries.

In 1860 the last of the inner fortifications was pulled down to make way for a great civic improvement, and on the site of the glacis was laid the beautiful Ring-strasse, or boulevard, two miles in circumference and 150 feet in width, the chief and distinctive glory of the modern city, what with its wonderful shade trees and the massing of the splendid public buildings along its course. The Ring-strasse, as its name implies, is a real ring or circle, though knocked out of true in a number of places until it is more of an octagon, and yet you can return to your starting point if you keep to the Ring. A system of street cars operates entirely around it, known as the "Ring Rund." The Ring is variously named in its different sections, as Operaring, as it passes the Opera; Karthnerring, where the great business street, Karthnerstrasse, crosses it; Burgring, by the Hofburg or town palaces of the Emperor, and Franzensring, Schottenring, etc.

Vienna is popularly misunderstood to be on "the beautiful blue Danube" River, but that mighty stream in its long course to the Black Sea really encircles the city some miles from its center. A canal winds through the heart of the city and connects with the Danube below the Prater, Vienna's great playground.

The Danube is the second largest river in Europe, being exceeded only by the Volga of Russia. Below Vienna its winding course of more than 1,200 miles to the Black Sea traverses a region richer in ethnological interest than any other in Europe, or perhaps in the world, and holding many commanding scenic beauties, as yet but little known.

LIFE IN BUDAPEST

The greatest city of the Danube—Vienna being in strict justice excluded from consideration—is Budapest, which is fairly cut in two by the broad expanse of the river. Formerly two cities, Buda on the right-hand side struggles up a picturesque mountain, and here on a high terrace is the magnificent palace of the King of Hungary, with a wonderful outlook over the river. Pest, on opposite side of the river, is the modern city and commercially important. Its location is upon a flat, so characteristic of the rich Danubian plains.

The population of the combined cities is about three-fourths of a million, and here is the center of all Hungarian ac-

THE BRONZE GUARD AROUND EMPEROR MAXIMILIAN'S TOMB: INNSBRUCK

No visitor to Innsbruck fails to look at Emperor Maximilians tomb in the Church of the Franciscans, or Court Church, attached to the Imperial Palace, for it is the most famous of its sights, and the group of 28 gigantic bronze figures, most of them weighing a good deal over a ton, that stand in the form of mourners around the gigantic marble sarcophagus, is among the most imposing and interesting specimens of 16th-century modelling and casting. Twenty-three of the figures represent

THE MATCHLESS FIGURE OF KING ARTHUR OF BRITAIN, IN INNSBRUCK

One of the most striking of the bronze figures guarding Maximilian's tomb. Maximilian, as Count of Tyrol, was much beloved by his subjects

PASS LUEG: AUSTRIA

"That Austria is, after Switzerland, the most mountainous region in Europe, and that more than four-fifths of her vast territory is over 600 feet above the level of the sea, is no doubt news to the majority of people" (see page 1191).

THE CITY OF LANDECK, IN THE TYROL

tivities, Hungary as a nation having little real culture, no manufacturing to speak of, in short, naught but a pastoral existence, outside of its capital city. The rich fertility of the Danubian plains has always made agriculture the natural exertion of the people just as the plains themselves constitute the principal area of the Kingdom. But the life in Budapest is compensatory for the dullness that pervades the rest of Hungary. Budapest is Paris, Vienna, and London in one, a combination of the gayeties of the capitals of the world, with a little distinctive Hungarian paprica spice thrown in.

The "Corso" along the Danube in Pest is the promenade whose group of open-air cafés and restaurants forms the hub of the gay Magyar life. Throughout the city almost every other building houses a café, so important a part do these establishments play in the national life.

There the business man partakes of his early breakfast of coffee and rolls, there he adjourns from his office on numerous occasions during the day for important business conferences, which are best had according to the semi-oriental idea of the Hungarians over a cup of coffee. And after the family dinner, which is almost invariably partaken of in one of the restaurants which are scattered through the city and among the parks which surround it, the café is again resorted to by the whole family as a last thing before retiring, which is often postponed till early morning, so enthralling are the gypsy music always to be heard in these public places and the other attractions of café life.

THE KINGDOM OF INDEPENDENT SERVIA

Twenty-four hours by steamer down the river from Budapest is Belgrade, the capital of the Kingdom of Servia. "White Town," as its name signifies, is situated high on the right bank of the Danube where the Save River has its confluence with the mighty stream. Just behind the city are the heights of Mount Avala, crowned by the remains of a citadel, the origin of which is variously credited to Prince Eugene of Austria or some early Serbish noble.

The chief charms of the city are its superb location, commanding for miles the winding course of the great river through the low Hungarian plains, and the interesting picture which its market presents, crowded with Servian peasantry in their brightly colored costumes, standing out sharply against the deep shadows of the great trees of the market site.

Servia is richest as an agricultural land, like all the Danubian countries. No one can survey the sweep of landscape from Mount Avala without conceding its rare farming and grazing possibilities. When Servia is fully developed along these natural lines she will be no mean nation. Indeed, she is not today, having rapidly in recent years forged away from the contemptuous appellation of being a nation of swine herds. True, hogs are still a great by-product of the fertile Servian soil, but wheat and corn and tobacco are becoming larger crops each year, and cattle and sheep bigger herds.

With stability of good government, which seems to be now vouchsafed, the Servian people seem to be entering upon an era of great national prosperity.

Beginning at Belgrade the Danube forms the boundary between Hungary and Servia; on the left are the low Hungarian flats, on the right the highlands of Servia.

Near where Hungarian and Servian territories end, the river becomes a narrow gorge as it penetrates a spur of the Carpathians or "Sieben Bergen," as these mountains are locally known. The gorge past the river widens into the semblance of a superb mountain lake of wild romantic grandeur called the Kazan. This and the Iron Gates or Cataracts a short distance below are the picture points of the Danube, and indeed the scenery here is as fine as any river scenery in Europe. On both sides of the Kazan and the passes leading in and out of it are ingeniously engineered highways hewn out of the solid rock. The older of these highways is on the right-hand side, and is now mostly in ruins. Said to have been built by the Roman Emperor Trajan, a tablet to

Photo by Nox McCain

TYPES OF SERVIAN WOMEN: BELGRADE

"The chief charms of the city are its superb location, commanding for miles the winding course of the great river through the low Hungarian plains, and the interesting picture which its market presents, crowded with Servian peasantry in their brightly colored costumes, standing out sharply against the deep shadows of the great trees of the market site" (see page 1210).

Photo by Nox McCain

A STORK'S NEST ON A HOUSE IN BELGRADE, THE CAPITAL OF SERVIA

Photo by Nox McCain

HANDSOMELY EMBROIDERED COSTUME OF A SERVIAN LADY: NISCH

Photo by Blair Jaekel

COAT WORN BY THE WOMEN OF NISCH, SERVIA

Photo by Nox McCain

THE PRISHTINA COSTUME, WORN BY SERVIAN WOMEN ON FEAST DAYS

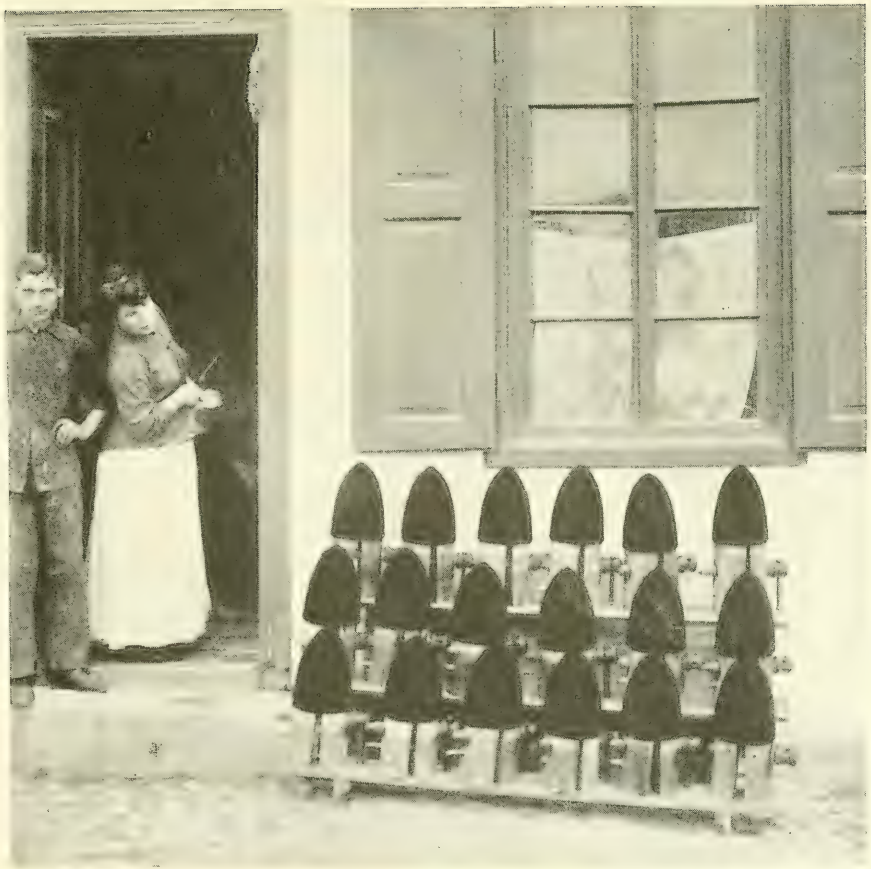


Photo by Nox McCain

A HAT STORE: BELGRADE, SERVIA

Photo by Nox McCain

A PEDDLER OF BELGRADE

Photo by Nox McCain

A FRIENDLY GLASS OF SLIVIVITZ: SERVIA

Photo by Nox McCain

ROYAL PALACE: BELGRADE, SERVIA

Photo by Nox McCain

THE CHERRY SELLER: BELGRADE MARKET

Photo by Nox McCain

STREET SCENE IN BELGRADE

"Servia is richest as an agricultural land, like all the Danubian countries" (see page 1210)

Photo by Nox McCain

whom is still to be seen, a more likely story credits the road to Emperor Tiberius in A. D. 33-34.

In places, where to hew out the solid rock seemed too big a task, the road was of wood. The wooden structure has long since rotted away, but the holes in the solid rock, into which the supporting timbers went, are still plainly to be seen.

On the left hand or Hungarian side is the Szechenyi Road, a splendid and comparatively modern structure, and a monument to Count Szechenyi, one of the most illustrious of Hungarians, who in the early days did much to foster Danube navigation.

Even in this remote corner of Austria-Hungary the strong arm of the law is ever present, the river stretches and the back country being policed by a heavily armed rural constabulary. Splendid order is maintained and the valuable fishing along the river is protected from poaching. In these lower reaches of the Danube, as in the other rivers emptying into the Black and Caspian Seas, sturgeon of the variety contributing the choicest of caviare and the best quality of isinglass, are found in abundance, and their catch forms a quite considerable occupation of the river people. Strangely enough, though, at Orsova, Hungary, in the center of the Danube caviare industry, one pays almost as much for a small portion of these palatable fish eggs as in a first-class New York restaurant.

At Orsova Hungary ends, and as the traveller follows the Danube to the sea he finds Rumania to his left and on his right the dominions of the luckiest of all the princes of the lucky house of Saxe-Coburg, Czar Ferdinand of Bulgaria.

Photo by D. C. Falls

HUNGARIAN GENTLEMEN IN PROCESSION: BUDAPEST

Photo by Trans-Atlantic Photo Co.

THE ANGELEAN, OR NATIONAL DANCE OF RUMANIA

This dance is performed almost every Sunday afternoon in the village square. Men and women join hands, and all pull in different directions, trying to break the chain thus formed

Photo by International Press Photo Co.

RUMANIAN DANCE GIRLS

NOTES ON RUMANIA

THE general public had been wont to regard the little nations of the Balkan Peninsula as comic-opera governments until recent events advertised the fact that they had been growing up into strong and lusty manhood. Bulgaria, Servia, and Montenegro have always kept themselves well in the public eye, the marriage of a daughter to the king of a great power, a spectacular revolution, or the change of faith of a crown prince, all having contributed to attracting and keeping the attention of the Western World.

One kingdom alone has kept to the even tenor of its way, and its history since its establishment has been a record of quiet progress.

Formed in 1859 by the union of Moldavia and Wallachia, two principalities tributary to the Sultan of Turkey, Rumania's beginnings were not auspicious. Its first ruler, Prince Cuza, a dissolute but well-intentioned man, strove by the most despotic methods to bring to fruition his democratic ideals, with the result that he was compelled to abdicate after a reign of seven years.

The choice of the people then fell upon Prince Charles of Hohenzollern, a member of the elder branch of that famous family, the younger branch of which is headed by the Emperor William of Germany.

To Charles of Hohenzollern, ably aided by his consort, Princess Elizabeth of Wied, better known as Carmen Sylva, the remarkable progress of Rumania is mainly due. He has raised her from a bankrupt vassal principality into a contented, prosperous, and independent kingdom.

Rumania is shaped like a boot, the Transylvania Mountains—the Hungarian boundary—forming the front and instep, and the River Danube—the Bulgarian boundary—the sole until it turns north, flowing through the country till it joins

Photos by International Press Photo Co.

A PASTOR AND HIS WIFE: BUCHAREST, RUMANIA

A RUMANIAN DANDY HAVING HIS SHOES SHINED

Photo by International Press Photo Co.

CADETS OF RUMANIA WITH THE PRIEST

Photo by International Press Photo Co.

COUNTRY PEOPLE OF RUMANIA

Photo by Trans-Atlantic Photo Co.

RUMANIAN DANCE, WHICH IS PERFORMED ON SUNDAYS AND HOLIDAYS IN FRONT OF THE DWELLINGS OF THE POPE OR PRIEST: IT STARTS WITH A MARCH AND RESEMBLES TO SOME EXTENT THE AMERICAN LANCERS

the Black Sea at the top of the heel. Along the seacoast lies a great sandy plain, interspersed with lagoons and marshes, called the Dobrudja; further inland is a rich inclined plain, stretching gradually upward to the mountains, and on this plain grows the wheat and maize that have made Rumania one of the great grain-producing countries of the world.

Here, too, grow valuable crops of tobacco, beans, and potatoes, while pleasant orchards of plum, damson, and apricot trees are found on every hand, the produce of which is distilled into a mild spirit known as *tsuica,* highly esteemed throughout the kingdom. In the foothills of the mountains are mile after mile of vineyards, which have raised Rumania to the rank of the fifth wine-producing country in Europe. Higher up in the mountains are vast forests, all carefully conservated — King Charles is an ardent forester— and their timber forms a valuable item in the country's exports. The coast fisheries are a source of considerable wealth, quantities of caviar being dispatched to Berlin, which is the distributary center of this industry, while the choicer fish are sent to Russia, Hungary, and Turkey to such an extent that coarse fish is actually imported from Russia.

Photo by International Press Photo Co.

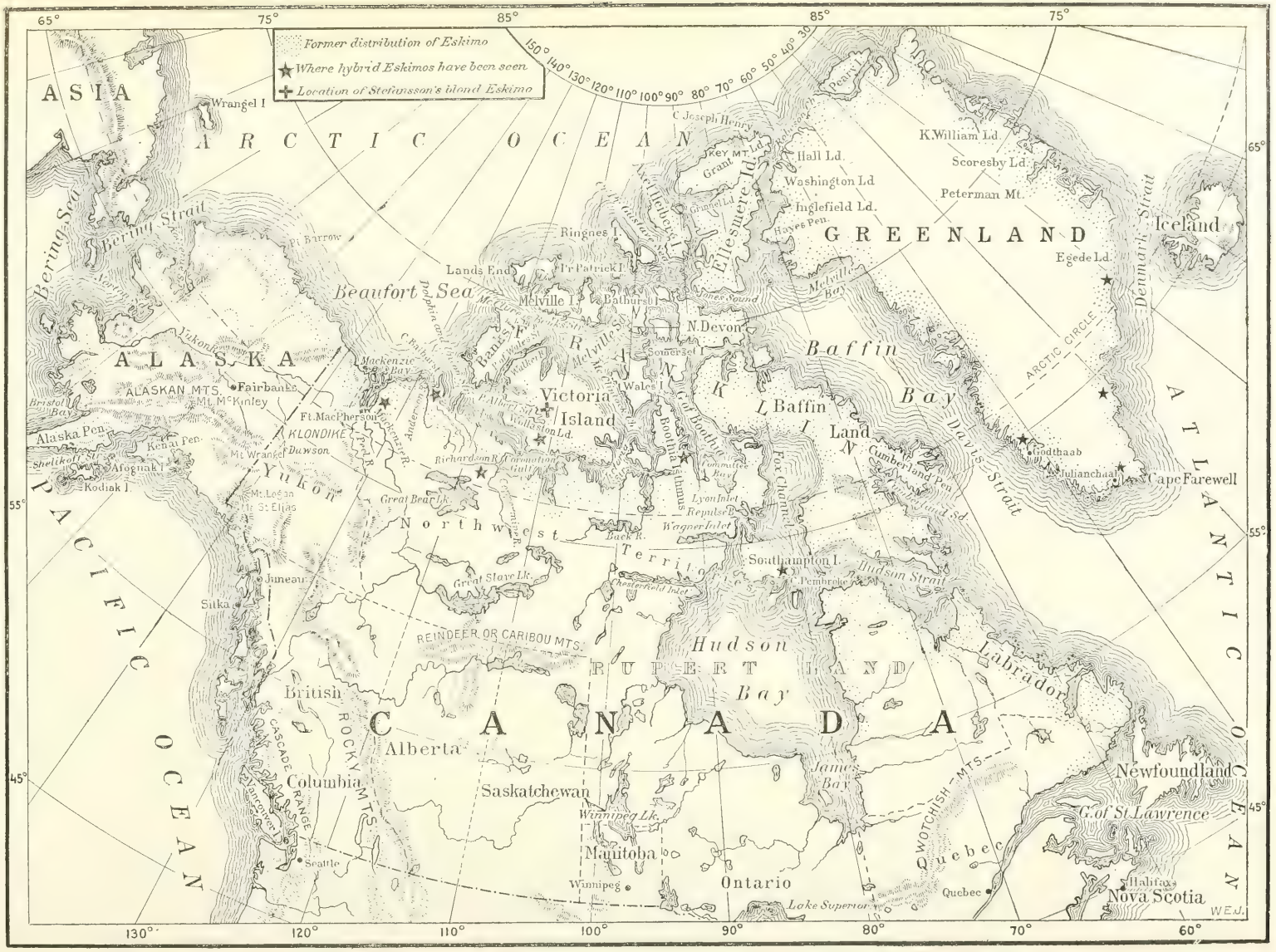
RIDING MASTER OF THE RUMANIAN KING

The backbone of the kingdom is a race of sturdy peasant proprietors, most of them owning 12 to 25 acres of freehold land, most of it being worked on a coöperative system. Most of these peasants are Vlachs, a race which is Latin in its language, culture, and descent. Their original progenitors were a colony of Roman soldiers, established on the banks of the Danube by the Emperor Trajan in A. D. 106. Their language descends from the rustic Latin of these soldiers, and, in spite of a long isolation, surrounded by Slavonic tongues, it retains its Latin characteristics to a remarkable extent, so much so that any one reasonably familiar with Latin will be able to read a Rumanian newspaper with but little difficulty, as many words are found which remain unaltered, just as they appear in the orations of Cicero.

While the Rumanian is intensely proud of his Roman language and descent, he gives his allegiance to the orthodox church. The State church is national and independent, but recognizes the Patriarch at Constantinople as the chief dignitary of the Greek Orthodox Church. Religious liberty is accorded to all, but the great bulk of the people belong to the national church. It must, however, be admitted that a great deal of anti-Semitism exists throughout the kingdom, due not to religious intolerance, but to a variety of other causes.

Rumania has a Jewish population amounting to one-twentieth of the entire inhabitants, a larger ratio than any other country in the world. These Jews are all of foreign origin, mainly from Poland and Russia, wear a distinctive dress, and speak a foreign language.

The country folks cling tenaciously to the national costume; for the men, white


Former distribution of Eskimo
Where hybrid Eskimos have been seen
Location of Stefansson's island Eskimo
ASIA
ARCTIC OCEAN
Wrangel I
Bering Sea
Bering Strait
Pt Barrow
Beaufort Sea
ALASKA
ALASKAN MTS.
Mt. McKinley
Fairbanks
Ft. MacPherson
KLONDIKE
Dawson
Yukon
Mackenzie R.
Mackenzie Bay
Bristol Bay
Alaska Pen.
Kenai Pen.
Sheltikof Str.
Afognak I.
Kodiak I.
Mt. Wrangel
Mt. Logan
Mt. St. Elias
PACIFIC OCEAN
Juneau
Sitka
Seattle
Vancouver
CASCADE RANGE
ROCKY MTS.
British Columbia
Alberta
Saskatchewan
Manitoba
Winnipeg
Winnipeg Lk.
Lake Superior
Ontario
Quebec
Montreal
Halifax
Nova Scotia
Newfoundland
G. of St. Lawrence
LABRADOR PENINSULA
Labrador
Hudson Bay
James Bay
REINDEER OR CARIBOU MTS.
WOTCHISH MTS.
Northwest Territories
RUPERT LAND
CANADA
Great Bear Lk.
Great Slave Lk.
Back R.
Chesterfield Inlet
Southampton I.
Baffin Land
Victoria Island
Banks I.
Melville I.
Prince of Wales I.
Boothia Peninsula
Gulf of Boothia
Committee Bay
Fox Channel
Repulse Bay
Wager Inlet
Lyon Inlet
Richardson R.
Coronation Gulf
Dolphin and Union Str.
Prince Albert Sd.
Wollaston Ld.
Baillie Hamilton I.
Cornwallis I.
Bathurst I.
Lands End
Pr Patrick I.
Ringnes I.
Ellesmere Ld.
Grant Ld.
Grinnell Ld.
Grant
Key Mt. Ld.
Hall Ld.
Washington Ld.
Inglefield Ld.
Hayes Pen.
Peary L.
C. Joseph Henry
K. William Ld.
Scoresby Ld.
Peterman Mt.
GREENLAND
Iceland
Egede Ld.
Godthaab
Julianchaab
Cape Farewell
Baffin Bay
Davis Strait
Hudson Strait
Cumberland Pen.
Cumberland Sd.
Frobisher B.
Melville Bay
Jones Sound
Smith Sd.
N. Devon
Somerset I.
Prince of Wales Str.
Peel Sd.
Lancaster Sd.
Barrow Str.
Parry Is.
Parry R.
Anderson R.
Franklin R.
Wellington Ld.
Melville Pen.
Boothia Isthmus
Lyon Inlet
Repulse B.
Wager Inlet
Pembroke
Chesterfield Inlet
Back R.
Great Slave Lk.
Great Bear Lk.
Mt. Logan
Mt. St. Elias
Yukon
Mt. Wrangel
Dawson
Fairbanks
Ft. MacPherson
Mackenzie R.
Mackenzie Bay
Bristol Bay
Alaska Pen.
Kenai Pen.
Sheltikof Str.
Afognak I.
Kodiak I.
Juneau
Sitka
Seattle
Vancouver
Winnipeg
Winnipeg Lk.
Lake Superior
Montreal
Quebec
Halifax
Nova Scotia
Newfoundland
G. of St. Lawrence
Labrador
Hudson Bay
James Bay
Southampton I.
Baffin Land
Victoria Island
Banks I.
Melville I.
Bathurst I.
Lands End
Pr Patrick I.
Ringnes I.
Ellesmere Ld.
Grant Ld.
Grinnell Ld.
Key Mt. Ld.
Hall Ld.
Washington Ld.
Inglefield Ld.
Hayes Pen.
Peary L.
C. Joseph Henry
K. William Ld.
Scoresby Ld.
Peterman Mt.
Iceland
Egede Ld.
Godthaab
Julianchaab
Cape Farewell
Baffin Bay
Davis Strait
Hudson Strait
Cumberland Pen.
Cumberland Sd.
Frobisher B.
Melville Bay
Jones Sound
Smith Sd.
N. Devon
Somerset I.
Prince of Wales I.
Peel Sd.
Lancaster Sd.
Barrow Str.
Parry Is.
Parry R.
Anderson R.
Franklin R.
Wellington Ld.
Melville Pen.
Boothia Isthmus
Lyon Inlet
Repulse B.
Wager Inlet
Pembroke
Chesterfield Inlet
Back R.
Great Slave Lk.
Great Bear Lk.
Mt. Logan
Mt. St. Elias
Yukon
Mt. Wrangel
Dawson
Fairbanks
Ft. MacPherson
Mackenzie R.
Mackenzie Bay
Bristol Bay
Alaska Pen.
Kenai Pen.
Sheltikof Str.
Afognak I.
Kodiak I.
Juneau
Sitka
Seattle
Vancouver
Winnipeg
Winnipeg Lk.
Lake Superior
Montreal
Quebec
Halifax
Nova Scotia
Newfoundland
G. of St. Lawrence
Labrador
Hudson Bay
James Bay
Southampton I.
Baffin Land
Victoria Island
Banks I.
Melville I.
Bathurst I.
Lands End
Pr Patrick I.
Ringnes I.
Ellesmere Ld.
Grant Ld.
Grinnell Ld.
Key Mt. Ld.
Hall Ld.
Washington Ld.
Inglefield Ld.
Hayes Pen.
Peary L.
C. Joseph Henry
K. William Ld.
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Barrow Str.
Parry Is.
Parry R.
Anderson R.
Franklin R.
Wellington Ld.
Melville Pen.
Boothia Isthmus
Lyon Inlet
Repulse B.
Wager Inlet
Pembroke
Chesterfield Inlet
Back R.
Great Slave Lk.
Great Bear Lk.
ATLANTIC OCEAN
ARCTIC CIRCLE
65°
75°
85°
55°
45°
150° 140° 130° 120° 110° 100° 90° 80° 70° 60° 50° 40° 30°
130°
120°
110°
100°
90°
80°
70°
60°
W.E.J.

trousers, a long white linen tunic, girded at the waist, embellished on high days and holidays with little sleeveless jackets of bewildering color and embroidery. The women on feast days emulate the rainbow in their clothes and bedeck themselves with endless strings of coins and necklaces of beads.

All classes are passionately fond of music and dancing, and when a dozen peasants get together there is bound to be a dance, the favorite time being after church on a Sunday, when they will dance for hours for the edification of the village pope and his wife.

There is a wealth of folk-lore, ballads, dance songs, and romantic tales, and these, together with an implicit belief in werewolves, vampires, and revenants, render the Rumanian peasant one of the most delightful and entertaining companions in the world.

THE ORIGIN OF STEFANSSON'S BLOND ESKIMO

By Major General A. W. Greely, U. S. Army

IN THE past few years there has been no Arctic discovery that has excited more general interest than the finding upon Wollaston Land, or Victoria Island, of native tribes who have never seen white men, and among whom are numerous individuals of the so-called blond Eskimo type.

The detailed account of these peculiar and hybrid Children of the Ice is due to the courage and endurance of an American explorer, Mr. Vilhjalmur Stefansson. With Dr. R. M. Anderson, he has made, under the auspices of the American Museum of Natural History, extensive and valuable contributions to the geography and the ethnology of the continental coast of North America and of the adjacent islands. Few are aware, however, that Stefansson has added a new inhabited district to Canada; yet such is the case. In that most valuable geographic publication, *Atlas of Canada,* issued by the Interior Department of the Dominion of Canada in 1906, on map 29, showing the aborigines, the word "uninhabited" is printed in red across the extent of Victoria Island.

As these reports of the current existence of hybrid Eskimo have given rise to wide discussion, and at times to adverse comment, it appears timely to present in connected form such detailed accounts of earlier explorers and investigators as bear on the subject. These extracts, which on the whole confirm the accuracy of Stefansson's observations, naturally relate to two differing phases of the question. First, as to the actual existence and as to the geographic distribution of the hybrid Eskimo—for such are the blond natives—and then as to their probable origin.

EXISTENCE AND DISTRIBUTION OF THE BLOND ESKIMO

Stefansson reports that during more than a year of intimate life among the Eskimo of Coronation Gulf and of Prince Albert Sound (off the west coast of Wollaston Land) he met about 1,000 of an estimated total population of 2,000 different natives who had never seen a white man. He adds: "The 200 visited in Prince Albert Sound differed in general features from the Eskimo of Alaska and of the Mackenzie River. Some of the Wollaston Land natives have blue eyes; 50 per cent have light eyebrows, and a few have reddish beards. The characteristics of these people seem to suggest a mixture of European and Eskimo blood."

The following extracts from the reports of various Arctic explorers—men of high standing and of unquestioned probity—disclose that many hybrid individuals have been found among the various Eskimo tribes, the country covered extending about 2,000 miles, from the coast of East Greenland westward to Wollaston Land. *Attention is called especially to the fact that the tribes herein mentioned are those so situated that in*

modern times—say since the discovery of America by Columbus—far the greater part of them could have had no contact with white men.

The presence of hybrid natives on the east coast of Greenland has always been credited by the Eskimo of the west coast. In his *Tales and Traditions of the Eskimo*, Dr. H. Rink, who lived 22 summers and 14 winters in Greenland, translates the following tale from the Eskimo language: "Iviangersook started for the south of Greenland, and having passed Cape Farewell, he came to the eastward to some light-haired people of European complexion."

In 1828-1829 Capt. W. A. Graah, Danish Royal Navy, explored the east coast of Greenland in search of the lost Scandinavian colonies, whose descendants were believed by some to still inhabit it. Of an east coast Greenlander who came to trade at Julianchaab, on the southwest coast, Graah says: "He had the long, lank, black hair and the black eyes of his race, but nothing else in his exterior characteristics of the Eskimo. He was about 6 feet high and strongly built."

Of the new tribe discovered at Kemisak, on the east coast, he adds: "They were like the generality of their countrymen of the east coast—a tall and well-made set of people. Most of the men had their eyebrows blackened, and some of them wore large mustachios. One had a long, black beard."

In describing a family of six, which he met at Iluidlek, he continues: "I observed on this occasion that the countenances of the two women had nothing in them of the ordinary Greenland physiognomy. Their whole appearance, indeed, presented none of the usual characteristics of their race, and, in particular, they had neither the prominent belly nor the corpulence of their countrywomen of the west coast. They were, both of them, above the middle size, and were remarkable for their clear complexion, their regularity of features, and the oval form of their heads."

In his summary on the inhabitants, Graah says: "The natives of the east coast of Greenland seem to me to have very little in their exterior in common with the genuine Eskimo. They have neither the full, fleshy person, nor the prominent paunches of the Eskimo; but on the contrary are slender and even meager. They are, moreover, distinguished from the Eskimo by their form of head and cast of countenance, which is handsomer and more expressive. The women and children have, many of them, brown hair and a complexion scarcely less fair than that of our (Danish) peasantry."

Graah's rather meager reports have been greatly extended and strikingly confirmed in definite and scientific detail by Capt. G. Holm and his associates in the Danish Royal Navy Expedition of 1883-1885. It is sufficient to quote only from the ethnological summary written by Prof. Soren Hansen. In this he says, of the Eskimo of East Greenland that in their eyes the color of the iris was brown, shading from very dark brown to a light brown, with a single exception—a young woman of 20 years, who had blue eyes. Observations were made of the color of the hair; of 38 women only three had the characteristic black hair, while 30 had dark-brown hair and three brown hair. None of these natives had ever seen white men. It was most striking that on the southwest coast, where European half-breeds have been born in large numbers during the past two centuries, no less than 16 out of 24 women had black hair.

The hybridization of the west coast Eskimo of Greenland during the past century has progressed so fast that its present 10,000 inhabitants are out of consideration. Rink says: "A pretty numerous class of half-breeds has originated, many Europeans belonging to the classes of sailors or laborers having married native women. In 1855 the half-breeds were calculated at 55 per cent of the inhabitants."

The west Greenland conditions of earlier centuries are worthy of consideration. Hans Egede, who entered west Greenland in 1721 and permanently established Christianity therein, says: "The Eskimo have broad faces and thick lips, are flat-nosed and of a brownish com-

Courtesy of Harper's Magazine

TRACKING AN ESKIMO CANOE (UMIAK) IN CALM WEATHER

Courtesy of Harper's Magazine

STEFANSSON'S PARTY BRINGING ASHORE A BEARDED SEAL

The party averaged seven Eskimo, four of these seven remaining with the expedition the entire four years. Among these four were Ilavinirk; his wife, Mamayauk; and their daughter, Nogosak. (Mamayauk is shown in the photograph at the extreme right.)

Courtesy of Harper's Magazine

THE WIFE OF ONE OF STEFANSSON'S ESKIMO COMPANIONS

plexion, *though some of them are quite handsome and white.*"

We are able, however, to go still farther back to a time when Greenland was yet free from modern European contact. Mr. David McRitchie has published an account of a voyage in which a Flushing captain, Nicholas Tunes, claimed to have reached in the summer of 1656 latitude 72° N., in Davis straits. In the original French of de Poincy he quotes Tunes as saying: "In regard to the inhabitants (of Greenland) we saw two kinds, who lived together on the most friendly terms. Of these one kind is very tall, well built, rather fair complexion, and very swift of foot. The others were very much smaller, of olive complexion, and tolerably well proportioned, except that their legs are short and thick. The former kind delight in hunting, for which they are suited by their agility and natural disposition, whereas the latter occupy themselves in fishing."

BLOND ESKIMO SEEN BY PARRY

Of the natives seen by Sir Edward Parry on the shores of Lyon Inlet in 1821 he writes: "We could scarcely believe them to be Eskimo. There was a degree of lankness in their faces. Their countenances impressed me with the idea of Indian rather than of Eskimo features; but this variety of physiognomy we afterward found to be not uncommon with these people. . . . Two men and three women (of one group) had good Roman noses. . . . Several children had complexions nearly as fair as Europeans. It may be added that the portraits of a few of these people in no way resemble Eskimo. . . . The people had never seen Indians."

Of the same tribes Dr. Alexander Fisher, surgeon of Parry's expedition and a keen observer, records in an unpublished journal as follows: "In making a few remarks on the people themselves, I must observe that although the major part of them displayed in great perfection the genuine Eskimo features, form, and other characteristics of these people, yet there are some who differ so materially in this respect that the most superficial observer could not help noticing it."

Speaking of the tallest Eskimo, 5 feet 9½ inches, he continues: "I think that the tallest men and women are of an Indian or mixed extraction." In describing the hybrids he adds: "In the first place, the most striking difference is that of the countenance, which is long and narrow. The nose is large and of that shape which is called Roman. In their persons, also, the mixed race are somewhat taller, better made, and less inclined to corpulency. Several other distinctions might be pointed out, but I think those already mentioned sufficiently show that those in question are not of the genuine Eskimo stock. It may be added that these people had never seen either Indians or Europeans."

Capt. G. F. Lyon, Royal Navy, in his attempt to reach Repulse Bay in 1824, fell in with a group of Eskimo near Cape Pembroke, Southampton Island. These natives had never seen Europeans, and of them he records: "The face of the woman was as perfect an oval as that of an European girl, with regular and even pretty features. Her mother was with her and had the same cast of countenance. The other women had the usual broad, flat faces and high cheek bones."

Capt. John Ross, Royal Navy, in his voyage to Boothia Isthmus, 1829-1833, saw many natives. He states that "the features of an elderly man, which were preserved by a portrait, differ considerably from the general character as if he had belonged to a different tribe. Another native from west Boothia had Indian rather than Eskimo features, though the tribe had never seen Indians."

Capt. G. Back, Royal Navy, in his journey to Back River in 1833 mentions an Eskimo who "could not have matured a more luxuriant beard," which, he adds, "yielded the palm only to that of Master George Killingworth, which was not only thick, broad, and yellow colored, but in length 5 feet 2 inches in size." Presumably from Back's reference the Eskimo's beard was brown in color.

ESKIMO SEEN BY FRANKLIN

Sir John Franklin, in his journey to the Polar Sea in 1821, met a single Eskimo near the mouth of the Coppermine.

Courtesy of Harper's Magazine

STEFANSSON'S PARTY PREPARING TO CAMP IN A PERMANENTLY DESERTED WINTER VILLAGE OF THE BLOND ESKIMO IN CORONATION GULF

The minimum winter temperature of the Coronation Gulf region is 55° F. below zero. The holes in the walls of the houses are not windows, but are made for convenience in passing household goods out at time of leaving. These blond Eskimo are migratory and build no permanent houses of any kind, which fact in large part accounts for their relative freedom from contagious and other diseases.

He writes that "the countenance of White Fox (Terregannoeuck) was oval, with a sufficiently prominent nose, and had nothing very different from a European face except in the smallness of the eyes, and perhaps in the narrowness of the forehead. His complexion was very fresh and red, and he had a longer beard than I had ever seen on an aboriginal inhabitant of America. It was between 2 and 3 inches long and perfectly white."

Thomas Simpson, who in 1837 explored the continental coast west to Point Barrow with P. W. Dease, met a band of 60 Eskimo to the west of the Mackenzie River. He records that "three men were remarkable for their good looks and a stature of 5 feet 10 inches to 6 feet. Some of them had light-colored eyes and complexion, which if cleaned from grease might have passed for fair in most parts of Europe."

On the lower Coppermine, in 1838, Dease fell in with an Eskimo man and his family. Dease says: "The stranger was about 6 feet high, stout, and well looking, with brown hair. He wore no labrets."

In 1839 Simpson met near the mouth of the Coppermine a party of four Eskimo, of whom one was "an average stout man about 6 feet high, with brown beard. His countenance would have been noble were it not disfigured by a hideous wen on the temple." This fair-bearded, noble-faced Eskimo giant was also seen by Dr. Richardson during his "boat journey through Rupert Land" in 1848, and again by Dr. John Rae in his Franklin search journey of the following year.

In his second land expedition, 1825-1827, Franklin met many Eskimo in the Cape Bathurst region, and writes: "One of them had a different cast of

Courtesy of Harper's Magazine

STEFANSSON VISITING A TEMPORARILY DESERTED VILLAGE OF THE BLOND ESKIMO ON THE ICE IN CORONATION GULF

The caches of property show that the Eskimo intend to return before the ice melts in the summer. The Coronation Gulf Eskimo settle on the ice of the bay in winter to hunt seal, and return to the interior of the island in summer, where they live on caribou

countenance from the rest; we supposed him to be descended from the Indians (with whom, however, they had long been at war)."

In 1865 a French missionary, Pere Émile Petitot, visited the Eskimo of Cape Bathurst, traveling down the Anderson River with four natives. He considered all his companions to be Eskimo, but, describing them carefully, states that they presented "four examples of various shapes of countenance. One was tall, well made, nearly white in complexion, with eyes quite devoid of the characteristic obliquity. The second had a large Roman nose, his eyes nearly at the top of the forehead, and his complexion was dark bronze, quite like that of an Indian. The third had a square-shaped face and a fair European complexion, reminding one of either Scotch or Russian physiognomies. The fourth was of the common Eskimo type—olive complexion, broad face, and flat nose." Petitot met one woman of fine face, with straight eyes, and having features that indicated a strain of European blood. Another woman had yellowish white hair.

In 1868 Petitot visited Fort MacPherson, on Peel River, where he saw many Eskimo. He adds: "Among these Eskimo coming from the west there was one whose hair and full beard were of a fiery red. His complexion was white, spotted with freckles. Doubtless he was a Russian halfbreed, as he was said to have come from the shores of Bering Sea."

Coming to Wollaston Land and Prince Albert

Courtesy of Harper's Magazine

A VILLAGE OF THE BLOND ESKIMO IN LATE MAY

The warm sun has caved in the snow-roofs and they have been replaced by caribou skins

Sound, where Stefansson found his blond Eskimo, we have confirmatory evidences of hybridization from two English sources of unquestioned reliability. One of these was that keen observer, Dr. Alexander Armstrong, surgeon of McClure's ship *Investigator,* whose crew made the first northwest passage. Wintering in Prince of Wales Strait, their parties discovered the Eskimo of Wollaston Land. They were living under the same conditions as when visited by Stefansson. Building a village on the sea ice, they lived by sealing, changing camp when the sealing grounds were exhausted. They used copper weapons and utensils entirely, and were devoid of both mercenary and thieving habits. They had never seen whites and were hostile both to the western Eskimo and to the Indians.

Of these Eskimo Armstrong writes: "I fancied that I could trace the outline of Indian features in both of the sexes. One woman had a good complexion, aquiline nose, and black hair. Those apparently of Indian extraction were taller, from 5 feet 7 to 5 feet 8 inches, and in one or two cases even more. In a few cases the forehead was somewhat vertical, but narrow. Our interpreter had less difficulty in understanding the Cape Bathurst Eskimo than those west (at Mackenzie River and Point Barrow) from the greater similarity of the dialect to the Eskimo language of Labrador."

Capt. R. Collinson, Royal Navy, in the *Enterprise,* wintered in Walker Bay, Prince Albert Sound, in 1851-1852. He saw much of the natives, of whom he writes: "Some among the tribes were of different features to others, their faces being oval, with a Jewish cast, and the nose aquiline. In one particular, that of having no means of going on the water, they differed from all the Eskimo that have yet been met with."

Courtesy of Harper's Magazine

DESERTED HOUSES ALL OF SNOW, AND ONE INHABITED HOUSE, WHOSE SNOW ROOF HAS BEEN REPLACED WITH SKINS: DOLPHIN AND UNION STRAITS

Courtesy of Harper's Magazine

IN THE LAND OF THE BLOND ESKIMO, SKINNING CARIBOU AND EXAMINING RIFLE: DOLPHIN AND UNION STRAITS

This was the first caribou which these people had ever seen shot with a rifle. Note the peculiar swallow-tail coats worn by the men, resembling in cut the formal dress suit of civilization. These people had never seen white men before

Courtesy of Harper's Magazine

TWO CARIBOU HUNTERS: CORONATION GULF

Caribou hunters armed with bows of spruce driftwood, reënforced with sinew backing, and arrows tipped with native copper. The hunters wear goggles of wood. Isolated from civilization, these people have been living in what is practically the Stone age. Stefansson says that he "found them independent, self-respecting, and prosperous. They did not beg; they did not pry into our affairs; they were hospitable, courteous, and truthful. In Prince Albert Sound I made a present of one needle each to the forty-three married women of the tribe. Of course I kept no books, but I feel certain that every one of those women brought me something with which to pay for the needle, most of them saying that they did not want me to think that they were people who accepted gifts."

The foregoing extracts show conclusively the existence of hybrid individuals among various Eskimo tribes, and of their distribution in quite unbroken continuity along the entire northern coast of North America in early days, prior to the general corruption of the Eskimo by contact with whites during the past century.

CONTACT OF ESKIMO AND NORSEMAN

The suggestion that the natives of Coronation Gulf have a strain of Scandinavian blood makes of interest the possibility and the probable date of personal contact between the two races. The researches of Dr. Thalbitzer show that the Eskimo formerly occupied the northerly coasts and inlets of North America from southern Labrador to the peninsula of Alaska, as well as the outer coasts of all Arctic islands, Greenland included. The record of Norse explorations in the new world, extending from the 10th to the middle of the 15th century, covered the Greenland coast south of the Arctic Circle, and the shores of the American continent probably from Baffin Land south to Nova Scotia, but certainly to include Labrador.

The latest word on the subject appears in two quarto volumes, "In Northern Mists," by Dr. F. Nansen. While recognizing Helluland as Laborador and Markland as Newfoundland, he considers Wineland as purely mythical, and rejects the views put forward by American scholars as to a Norse settlement in Nova Scotia, viewed by some as the most southerly colony. In this advocacy a distinguished American botanist, Dr. M. L. Fernald, brings botanical evidence to prove that the three plants most depended on to locate Wineland—the *vinber, hveiti,* and *mosurr*—are, respectively, the mountain cranberry (or a wild

Courtesy of Harper's Magazine

BLOND ESKIMO DISCOVERED BY STEFANSSON IN PRINCE ALBERT SOUND, VICTORIA ISLAND

All individuals in this picture have light eyebrows. The men have light beards so far as they have any, and the man next the woman has light blue eyes as well. They may be descended from the Scandinavian colony which disappeared from Greenland centuries ago (see page 1237). The characteristics of these people seem to suggest a mixture of European and Eskimo blood.

currant), the strand wheat, and the canoe birch.

In any event direct and prolonged contact of the Norsemen with the Eskimo could have existed only at the permanent Norse settlements, of which two only are known—in the Greenland districts of Godthaab and of Julianehaab—whose fortunes will be discussed.

ARE THE BLOND ESKIMO DESCENDED FROM THE LOST SCANDINAVIAN COLONY?

In a letter of Stefansson from Langton Bay he wrote: "A point of some interest is our discovery of people in southwestern Victoria Land who are strikingly non-Eskimo in type; in fact look more like north Europeans than Eskimo. Their speech and culture is Eskimo, though I found one or two words that might reasonably be thought to be from old Norse. . . . It seems to me that if admixture of white blood is the explanation of the origin of the fair type in western and southwestern Victoria Land, then the only historical event that can explain it is the disappearance from Greenland of the Scandinavian colony of 3,000." He adds that these natives had never seen white men.

It may here be said that the opinions expressed by the majority of previous explorers, based on their own observations, as shown in the foregoing extracts, incline to the belief that the admixture is of Indian blood. But it should be added that *they were unfamiliar with the ethnological history of Greenland, and that they fail to indicate how an Indian admixture should produce fair complexions instead of bronze.*

The Norse colonists of the West Bygd (Godthaab) and of the East Bygd (Julianehaab) must have numbered several thousands, as several hundred ruins of houses, churches, etc., have been located around the fertile, ice-free fiords of southern Greenland. Their fate is unknown since near the end of the 15th century, possibly 1476.

Dr. Nansen, in *Northern Mists,* writes of them: "Owing to the long severance from Europe, they were obliged to adopt more of the Eskimo way of life. By degrees they adopted the Eskimo's more migratory life along the outer coast. Then, again, the Eskimo women were probably no less attractive to the Northerners of that time than they are to those of the present day, and thus much mixture of blood gradually resulted. The children came to speak the Eskimo language, and took at once to a wholly Eskimo way of life, just as at present the children of the Danes and Eskimo do in Greenland. The Norsemen must have by degrees become Eskimo, both physically and mentally; and when the country was rediscovered in the 15th and 16th centuries, there were only Eskimo there, while all traces of Norwegian-Greenland culture seemed to have disappeared."

Nansen continues: "It would doubtless seem reasonable to expect that the descendants of the ancient Norsemen of Greenland and of the Eskimo, with whom they became absorbed, should have shown signs in their external appearance of this descent when discovered in the 16th and 17th centuries."

Dr. Rink, in *Danish Greenland,* says: "An ancient and not untrustworthy account makes mention of certain Christian Greenlanders, who, in the year 1342, fell off from their own religion, consorted with the Skrellings (Eskimo), and adopted their mode of life." He adds: "When, subsequently to the rediscovery of Greenland, the southern districts were again visited by European travelers, many individuals were found amongst the natives exhibiting a complexion, and also a frame of body, which seemed to indicate an admixture with European blood—a fact which has also been observed with regard to the natives east of Cape Farewell."

Of the hybrids of the west coast of Greenland, McRitchie, commenting on Tunes's voyage of 1656, adds: "The small, olive complexioned, short-legged people are at once recognizable as Eskimo; but their taller and fairer comrades give rise to speculation. The readiest suggestion is that they were descended from the early Norse settlers. It is believed by many that the Norsemen were not exterminated by the Eskimo, but were gradually absorbed by them,

through successive intermarriages." Tunes's report would indicate that the fusion was not entirely complete in 1656.

Of the fair-haired people on the east coast of Greenland, Graah says: "But as I should venture to conclude that the Eskimo of Hudson Bay have not any claims to the honors of a Roman parentage from the circumstance of Sir Edward Parry's having seen among them many good Roman noses, neither do I conceive that the natives of the east coast of Greenland descended from the old Icelandic colonies because they resemble Europeans in some points." Graah believed that "they were originally of the same stock as the Eskimo."

Graah's opinions are clearly controverted by Hansen's anthropometrical measurements of 91 Eskimo of the east coast, which prove that they are not of pure stock, for the Eskimo is decidedly dolichocephalic, or long-headed. The cranial indexes of but 29, less than 30 per cent, of these East Greenland natives are of this type, while 57 are round-headed and 8 short-headed.

Of the Eskimo of the central North American coasts and islands, Sir John Richardson says: "In their position they have little or no intercourse with other nations, and have borrowed nothing whatever, either from the Europeans or the *Tinné* — the conterminous Indian people." Bearing incidentally and adversely on their freedom from Indian hybridization, he continues: "I merely remark that the Eskimo differ more in physical aspect from their nearest neighbors than the red races do from one another. . . . The dissociation of the Eskimo from the neighboring nations, on account of their physical dissimilarity, is met by an argument (from other sources) for the mutual affinity deduced from philological coincidences." While refraining from a definite decision, he incidentally remarks that "they seem to have most of the vices, as well as the virtues, of the Norwegian vikings."

It is most interesting to note an opinion hazarded by Thomas Simpson, who in 1838 was exploring Richardson River, accompanied by an Eskimo interpreter and by two Hare Indians. Meeting a fair-haired Eskimo, he says: "The slender, agile figures of the Hares contrasted with the square, rugged forms of these natives of the sea. It seemed as if on the northern confines of a new continent I had together before me descendants of the nomadic Tartar and the sea-roving Scandinavian, two of the most dissimilar and widely separate races of the ancient world."

Probably this opinion of 74 years since is among the earliest assumptions that Scandinavian blood is an element in the hybridization of the Eskimo of the coasts of the continent of North America.

That the admixture of alien blood among the hybrid natives of Victoria Land originated in regions to the eastward seems assured from the greater homogeneity of the language and of the customs of the blond Eskimo with those of eastern tribes than with the tribal characteristics of their Inuit brethren to the west.

If the blond Eskimo are descendants of Norse-Greenlander ancestors of four centuries since, the Norse strain must have been overwhelmingly diluted through pure Eskimo intermarriages. If such is the case, one must consider the "blonds" of today as perchance a remarkable instance of that occasional reversion of types, whereby a passing race gradually resumes the general form of its ancient ancestors.

Possibly, however, it may be a case of atavism—that is, the recurrence in a descendant of characters of a remote ancestor—instead of those of an immediate or near ancestor, similar to other abnormal developments that have been pointed out by scientists.

Finally, it may be said that the conditions and facts developed by Stefansson's explorations and discoveries, when associated with information drawn from the accounts of earlier explorers, present an intricate racial problem that may well tax the acuteness of American ethnologists for some time.

Photo by D. W. and A. S. Iddings. Copyright by Keystone View Co.

RUMANIAN CHILDREN IN NATIONAL COSTUME

"The country folks of Rumania cling tenaciously to the national costume; for the men, white trousers, a long white linen tunic, girded at the waist, embellished on high days and holidays with little sleeveless jackets of bewildering color and embroidery. The women on feast days emulate the rainbow in their clothes and bedeck themselves with endless strings of coins and necklaces of beads" (see pages 1219-1223).

THE TAILED PEOPLE OF NIGERIA

IN THE remote part of northern Nigeria, not yet under the complete control of the British, there dwell a people whose women wear tails and are proud of them.

True it is that these tails are not of flesh and blood, but none the less they play an important part in the social life of the people, for they are the outward and visible sign of the matronly dignity.

When a woman of the Kagoro, Kajji, or of four other neighboring tribes—the Atlakka, Morva, Katab, or the Jaba—becomes a bride, she puts off forever the simple girdle of twisted grass that, up to that moment, had been her sole adornment, and assumes the apron of leaves and the tremendously significant tail, or *kunnok,* as it is called.

In each of the tribes the *kunnok* varies

From "The Tailed Head-Hunters of Nigeria," by Maj. A. J. N. Tremearne. J. B. Lippincott Co.

THE TAILED KAGORO WOMEN OF TUKU TOZO

The tail worn by most of these women is shorter and thicker than that in favor farther north. The woman with the hair is an Attakka, the hair being probably a sign of mourning

From "The Tailed Head-Hunters of Nigeria," by Maj. A. J. N. Tremearne. J. B. Lippincott Co.

KAJJI WOMEN OF MERSA

The tail—the sign of marriage—worn by most of these tribes is like the above, and is nearly always worn over a bunch of leaves. Nos. 1, 2, and 3 have decorated the edges of their tails with beads, and in the case of Nos. 1 and 3 the stumps have been cased in brass.

From "The Tailed Head-Hunters of Nigeria," by Maj. A. J. N. Tremearne. J. B. Lippincott Co.

NIGERIAN NATIVES WITH TAILS

A Kagoro woman from Tuku Tozo and an Attakka woman

in form, sometimes long and thin, at others short, mushroom-like and stumpy, or shaped like a long bell. These tails are made of palm fiber, plaited or bound tightly together with string and usually stained red with an earth, which is also used for the further adornment of the lady's body.

Often the *kunnok* is worn quite plain, but the more ambitious modes prescribe an embellishment of brass wire and colored glass beads.

The Kagoro women are distinguished by the Quaker-like simplicity of their attire; they wear the shortest and plainest of tails, a few beads round the neck, occasionally a beaded band by which the tail is attached, and perhaps a really fashionable lady will add a bracelet or leglet of beads; but the *kunnok* itself remains in all its native severity.

The ladies of the Kajji tribe, however, affect a greater elegance; their tails are of greater length, the "stumps" being covered with intricate designs worked in brass and copper wire, while the wheel-shaped terminal is gay with colored beads set in a bed of liquid rubber, of which there is a great deal in the country. In this tribe the *kunnok* is generally worn over a bunch of leaves or grass similar to that which the ladies of all the tribes depend from their girdles in front. Sometimes a Kajji matron who desires to be a leader in the fashionable world will wear a tiny iron bell just above the tail, but this is a rare occurrence, and the bell is not often seen.

While the tail is essentially the mark of the married woman, there are certain occasions, such as dances or feasts, when it is worn by the little girls, who at such

times may also wear the bunch of leaves at front of the girdle. This is a rare privilege and has some religious significance.

To add further to their beauty, both the upper and lower lips of these women are pierced in order to admit a flat, round disk of wood called the *tichiak*, which is usually about the size of a half dollar. The effect of this custom is, from an occidental point of view, singularly distressing, for when viewed in profile the lady presents an appearance by no means unlike that of a pig. The lips of the little girls are pierced when they are about seven or eight years of age, and a piece of wood is inserted and worn for a time until a larger one takes its place, the opening being thus gradually enlarged until a full-sized *tichiak* can be carried without discomfort. The object of this singularly disfiguring adornment is to prevent the women from eating dogs, which are considered the greatest delicacy by the men of the tribes.

Both sexes decorate the body with regular designs; the chests and backs of the little girls are scarified at a very early age, the incisions forming the design being painted with grease mixed with soot. When they arrive at marriageable age, the girls undergo a further ordeal, for two sets of parallel lines are cut both on the chest and the back, and as soon as possible after marriage the head lines are made. These consist of a number of short cuts across the forehead, extending from ear to ear, and 13 long, slanting lines are cut on each cheek from ear to chin, so that probably no other woman in the world better exemplifies the old French proverb, *Il faut suffrir pour être belle*.

Not one of these ladies would dare attire herself in other than the prescribed fashion, although no punishment would be inflicted save the general disapproval of the community; but that in savage countries is apt to assume very disagreeable forms.

The authority upon these people is Major A. J. N. Tremearne, upon whose book, "The Tailed Head-Hunters of Nigeria" (J. B. Lippincott Co., Philadelphia), the above notes are based. Major Tremearne has served in Nigeria both as a police and political officer, and has had singularly good opportunities of observing these primitive people, and as a trained anthropologist his description of their manners, habits, and customs is of great value. The volume has 355 pages, 38 photographic illustrations, and a map.

SUNRISE AND SUNSET FROM MOUNT SINAI

By Rev. Sartell Prentice, Jr., D. D.

"WE SAW the sun rise from the summit of Mount Sinai, a sight few of us will ever forget."

Sinai! What word has greater power to awaken slumbering memories of the past! We, too, were going to Sinai, and as Palmer's words recurred to us we decided to camp one night upon the summit; to watch the sun set and rise again. Palmer has said of that early morning glimpse of glory: "The effects were, if possible, more beautiful than those of sunset, and the few clouds that still lingered around the peaks heightened and concentrated the lovely coloring of blue and gold and rosy light."

Letters from our dragoman were eloquent with his dismay. No one had ever before pitched tents upon the mountain; there would surely be snow to hinder; the monks would be certain to object; in brief, it was not possible. Opposition but fed the desire until it grew into an obsession, and the sunrise from Mount Sinai threatened to become the *raison d'être* of our pilgrimage.

We reached the convent of St. Catharine, at the foot of Sinai, on the 24th of February, and pitched our tents among the olive trees of the garden preparatory to the climb next day. The almond, peach, lemon, and orange trees were in

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THE VALLEY OF EL RAHA: SHOWING TO THE RIGHT THE PLAIN OF ASSEMBLAGE, WHERE IT IS BELIEVED THE ISRAELITES GATHERED WHEN MOSES DELIVERED THE TEN COMMANDMENTS (SEE PAGE 1251)

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LOOKING DOWN ON THE MONASTERY OF ST. CATHERINE, IN THE DESERT OF SINAI

Excepting for the Mount Sinai Monastery, which from these heights looks like a little toy fort built of blocks, the region is still and hushed and almost deserted. Its massive walls, raised by the peace-loving and God-fearing monks under Justinian, in 527 A. D. (as a protection against the marauding Bedouin tribes that infest this part of the country), when the wealth of an empire was possessed by the builders and occupants of the monastery, are in the same condition as when built, 1400 years ago. Today, however, the Christian world keeps a watchful eye over this mountain monastery and its contents, and the Bedouins, knowing this to be the fact, are on friendly as well as visiting terms with the monks.

Photo and copyright by Underwood & Underwood

In the monastery are stored the priceless books narrating the history of Christianity in the tongue of every Christian nation. Slowly the Brotherhood of the Mount Sinai monks is dying out, there being but 20 or 25 at the present time. The life and the pay (not even enough to buy tobacco) are not sufficient inducements for young recruits to join the forces that year by year are growing smaller, and in the course of a few years the treasures of the monastery will no doubt be removed, and the Mount Sinai Monastery will be only a memory to remind one of the greatness of its founder—Justinian.

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ST. CATHERINE'S MONASTERY: SINAI

Showing the outside wall and the little cage through which, until not many years ago, visitors entered the monastery, being drawn up by a rope which was hauled by a windlass within the wall.

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SOUTH SIDE OF MONASTERY ENCLOSURE, SINAI: LIVING ROOMS OF HUMBLE BRETHREN

Photo and copyright by Underwood & Underwood

GARDEN OF ST. CATHERINE'S MONASTERY, AT THE FOOT OF THE MOUNTAIN OF THE TEN COMMANDMENTS

"The gardens flourish by virtue of irrigation, their fruit trees, flowers, and vegetables making a mass of color and green whose beauty is enhanced, if not created, by the memory of the sands and barren deserts that must be crossed to reach them."

full bloom, and their white and pink blossoms mingled with the green of the olive leaves and carpeted the ground, filling the air with the burden of their fragrance.

No photographs that we had seen prepared us for the beauty of the Valley of Leja, in which the convent stands. The broad plain of El Raha, where tradition says Israel encamped, narrows to a gorge. The cliffs rise on either hand, sheer masses of red granite a thousand feet in height, their sides furrowed and seamed with massive buttresses thrust out and tortuous crevices receding, the crests, ragged and crenelated, cutting a fantastic outline against the sky, while so abrupt is the ascent their brows fairly seem to overhang the valley.

Far up on the higher crags of the giant ellipse of cliffs the faintly penciled outlines of the huge wooden crosses, with which the monks have sentineled their valley, lie against the deep blue sky, thrusting their message out to all the mountains clustered round about.

THE MONASTERY OF ST. CATHERINE'S

We spent the afternoon in the maze-like gardens, which descend from the convent walls in terraces, each with its flight of steps, for a thousand feet or more. Below the last garden are grouped the ruins of the stone huts that housed the soldiers brought by Abbas Pasha to build his palace on the mountain and the road to the summit, which still bears his name. Next comes a low hill at the entrance to the Wady es Sheik, the scene of the worship of the golden calf, so tradition asserts, and beyond that is the plain of El Raha, encircled by the rugged red mountains.

The gardens flourish by virtue of irrigation, their fruit trees, flowers, and vegetables making a mass of color and green whose beauty is enhanced, if not created, by the memory of the sands and barren deserts that must be crossed to reach them.

In the meanwhile the monks had swept and aired the crypt of their mortuary chapel, had burned incense in its vaults, and now invited us to enter.

A monk dying at Mount Sinai is buried in the ground for a year; during that time his grave is watered, for the atmosphere is so dry that lacking such care his bones would turn utterly to dust. After the year the bones are disinterred and placed in the crypt of the chapel; those of the higher dignitaries at one end; those of the monks and brethren at the other, neatly squared and banked in regular and precise lines, which are broken only by the bony hands which occasionally project in ghastly welcome.

Behind the door, in velvet skull cap and monkish robe, sits St. Stephen, the porter of the convent nearly 350 years ago. His bony jaw rests in one fleshless palm, while the other hand rattles among the keys lying in his lap—the symbols of the office he vacated centuries ago. When he last kept watch and ward over the portals, Philip II was king in Spain, the Armada was threatening the coasts of England, the bells of St. Germain were ringing in the day of St. Bartholomew, and Calvin's voice had hardly fallen silent in Geneva. The world has traveled far since then.

The moon rose full that evening. The jagged mountain line lay in blackened silhouette against the sky; the shadows of the olive leaves, gently swaying in the evening breeze, fell upon the white surface of our tents. The moonlight cast a checkered pattern upon the almond blossoms lying about our feet; it lit up the opposite cliffs of Sinai, throwing dark shadows into the crevices, veiling yet magnifying, until the mountains seemed to grow and tower above us, more stern and forbidding by night even than by day. One cross, of all that crowned the heights, stood out for a moment in penciled blackness against the full white surface of the moon; then, sinking over its lower rim, it joined its brethren in obscurity.

I woke once during the night, just as the convent bells were ringing to call the brethren to prayers, for from midnight until 7 in the morning the monks must keep their vigils. The bells fell silent, their echoes died away among the rocks, but they called into momentary vision the recollection of the spires of New England churches rising white above their

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THE PLAIN OF ASSEMBLAGE

"The cliffs rise on either hand, sheer masses of red granite a thousand feet in height, their sides furrowed and seamed with massive buttresses thrust out and tortuous crevices receding; the crests, ragged and crenelated, cutting a fantastic outline against the sky, while so abrupt is the ascent their brows fairly seem to overhang the valley. Far up on the higher crags of the giant ellipse of cliffs the faintly penciled outlines of the huge wooden crosses, with which the monks have sentineled their valley, lie against the deep blue sky, thrusting their message out to all the mountains clustered round about" (see also page 1243).

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MOUNT SINAI TOWERING ABOVE THE PLAIN OF ASSEMBLAGE

Here on this plain, where the goats and sheep are now grazing, there were gathered the Children of Israel during the 40 days and 40 nights that Moses, obscured from sight on the mountain-top by the clouds, was holding communion with Jehovah, just previous to the deliverance of the Ten Commandments.

"And it came to pass on the third day in the morning, that there were thunders and lightnings, and a thick cloud upon the mount, and the voice of the trumpet exceeding loud; so that all the people that was in the camp trembled. And Moses brought forth the people out of the camp to meet with God; and they stood at the nether part of the mount. And Mount Sinai was altogether on a smoke, because the Lord descended upon it in fire; and the smoke thereof ascended as the smoke of a furnace, and the whole mount quaked greatly. And when the voice of the trumpet sounded long, and waxed louder and louder, Moses spake, and God answered him by a voice. And the Lord came down upon Mount Sinai, on the top of the mount; and the Lord called Moses up to the top of the mount; and Moses went up." Exodus xix: 16–20.

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THE STONE GATE HALF WAY UP MOUNT SINAI

Formerly there was a monk placed at this particular gate, to pass only those who were freed of all sin by the Holy Communion and who bore a pass from the monastery as a proof

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THE CHAPEL ON THE TOP OF ST. CATHERINE, THE HIGHEST PEAK OF JEBEL MUSA, "THE MOUNTAIN OF THE LAW," 8,536 FEET HIGH

"Here, on a narrow platform, we found a mosque and a Christian chapel almost side by side, symbols of the two great faiths which today command the worship of so many millions of men and whose antagonisms once convulsed the Mediterranean" (see page 1258).

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A HUGE ROCK ON THE PLAIN OF ASSEMBLAGE, UNDER WHICH A BLIND BEDOUIN HAS LIVED AS A HERMIT FOR FORTY YEARS

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THE BLIND BEDOUIN WHO HAS LIVED UNDER THIS ROCK ON THE PLAIN OF ASSEMBLAGE FOR FORTY YEARS

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"THE MOUNTAIN OF THE LAW"

Mount Sinai from the north, viewed at an elevation of 6,740 feet from the summit of Jebel Meraji.

"And the glory of the Lord abode upon Mount Sinai, and the cloud covered it six days: and the seventh day he called unto Moses out of the midst of the cloud. And the sight of the glory of the Lord was like devouring fire on the top of the mount in the eyes of the children of Israel. And Moses went into the midst of the cloud, and gat him up into the mount: and Moses was in the mount forty days and forty nights." Exodus xxii: 15–18.

church-yard trees, and the sound of their bells ringing faintly down the valleys of the Green Mountains.

CLIMBING THE SACRED MOUNTS

It was broad daylight when I next awoke; the sun was shining in under the tent, and voices in Arabic were sounding without. After breakfast our tents were packed on three camels and sent up the road of Abbas Pasha to the plain of the cypress tree, near the summit of Sinai, while we, with a monk as guide and a Bedouin for a porter, set out to climb the pilgrim steps. While we were waiting for our guide, I searched the face of the great precipice of Sinai with a field glass for some evidence of a practicable pathway, for some break in the mass of rock, but though I searched almost inch by inch, I could detect no possible entrance through the cliff.

Leaving the convent, we walked up the valley for perhaps a third of a mile, picking our way over a boulder-strewn slope, until we came to a crack in the face of the cliff, a mere seam down the mountain side, where we found the first of the steps. There are some 7,000 of these, which lead up a gorge 12 to 15 feet wide, zigzagging from side to side. The cliffs rise sheer on either hand, water-washed and time-worn, cracked and fractured by the extremes of heat and cold. Fragments of rock project and overhang the path, looking as if the lightest touch would send them flying. In fact the pilgrim steps have suffered severely from falling boulders; they are chipped, cracked, and smashed, in places utterly destroyed, and the path is thickly strewn with the fragments.

Few things testify so eloquently to the vitality of the spirit of ancient monasticism as the paved road which leads into the Sinai range through the Nakb el Howi Pass and these steps up Mount Sinai. The labor of cutting, carrying, and placing such stones must have been enormous.

Early in the ascent we came to a spring of clear, cold water, issuing from beneath a gigantic boulder. Here, the Bedouins say, Moses watered his sheep. For some time after leaving the spring we kept the convent in sight; it seemed to come nearer and nearer to the mountain as we climbed and to lie more immediately below us, until a curtain of rock crept out and hid it from our sight.

The path led steeply up between high and narrow walls of rock, the sky a mere slit above our heads, until we halted for a moment's rest at the Chapel of the Virgin, and here, tradition says, a plague of fleas once so harassed the monks that they decided in desperation to abandon the convent. They took their way up the mountain on a final pilgrimage to its holy places, when the Virgin met them at this spot and commanded their return. On again reaching the convent they found it utterly deserted by the insects. Presumably they had gone out in a body to find the monks, but how they had missed them in the narrow path the legend does not say.

The path grew steeper after leaving the chapel until we came to an archway, where formerly pilgrims were confessed; then we mounted a flight of a hundred perfect steps to a second archway, where they received their certificates of absolution and were permitted to pass on. Just beyond lay the Plain of the Cypress Tree. A few hundred square feet of coarse grass, a pond a hundred feet across, and a huge cypress tree lay beneath a circle of low cliffs. Such a spot would be passed unnoticed anywhere in our Eastern States, but in these wastes of sands and barren rocks, grass, however coarse, water, and a tree halt the attention and haunt the memory.

THE SUMMIT OF SAFSAFAH

Leaving the ladies here to rest, F. and I set off to climb Jebel Safsafah, one of the horns of Mount Sinai. The path was long and rough. It led us up and down through a succession of valleys until we came to the final ascent of Safsafah, when a rough climb of 20 minutes brought us to a narrow crevice with an abysmal precipice at our feet. Nearly 2,000 feet below was one of the farms belonging to the convent, surrounding the house where the brother lives whom the convent has placed in charge, a restful touch of green against the wilderness

of sand. Near by was a long row of black Bedouin tents, the flocks of goats browsing among the rocks, while to the right the long plain of el Raha stretched out to the Nakb el Howi Pass.

Above this crevice rose a smooth, rounding mass of rock 40 feet or more in height, on the crest of which the monks have planted a huge wooden cross. This is the summit of Safsafah (see picture, page 1259). Baedeker says the ascent requires a steady head. Meistermann says: "Le dernier pic, droit et glissant, n'est plus accessible qu'aux touristes robustes, qui ne sont pas sujet au vertige, et qui sont determinés a y grimper en s'aidant des pieds et des mains."

I did not find it so. The climb is difficult, perhaps, but in no place should I call it dangerous, nor does it invite dizziness. The view is limited except to the north; there range after range runs back toward the horizon, with great Gerbel Serbal in the distance. Except at the north, however, the rim of the Sinaitic range restricts the view.

We came back to the cypress tree for lunch, watched the arrival of the camels and the pitching of our tents, and then we began the final climb of the Jebel Musa summit of Mount Sinai. On the edge of the plain we passed a little chapel dedicated to Elijah, for the Greek Church has located here Elijah's vision of God, when, fleeing from the wrath of Jezebel, he came to Horeb, "the Mountain of God."

Here, they say, he heard the great and mighty wind, which rent the mountains and brake in pieces the rocks; here he witnessed the earthquake and the fire, and heard after the fire the still, small voice saying, "What doest thou here, Elijah?"

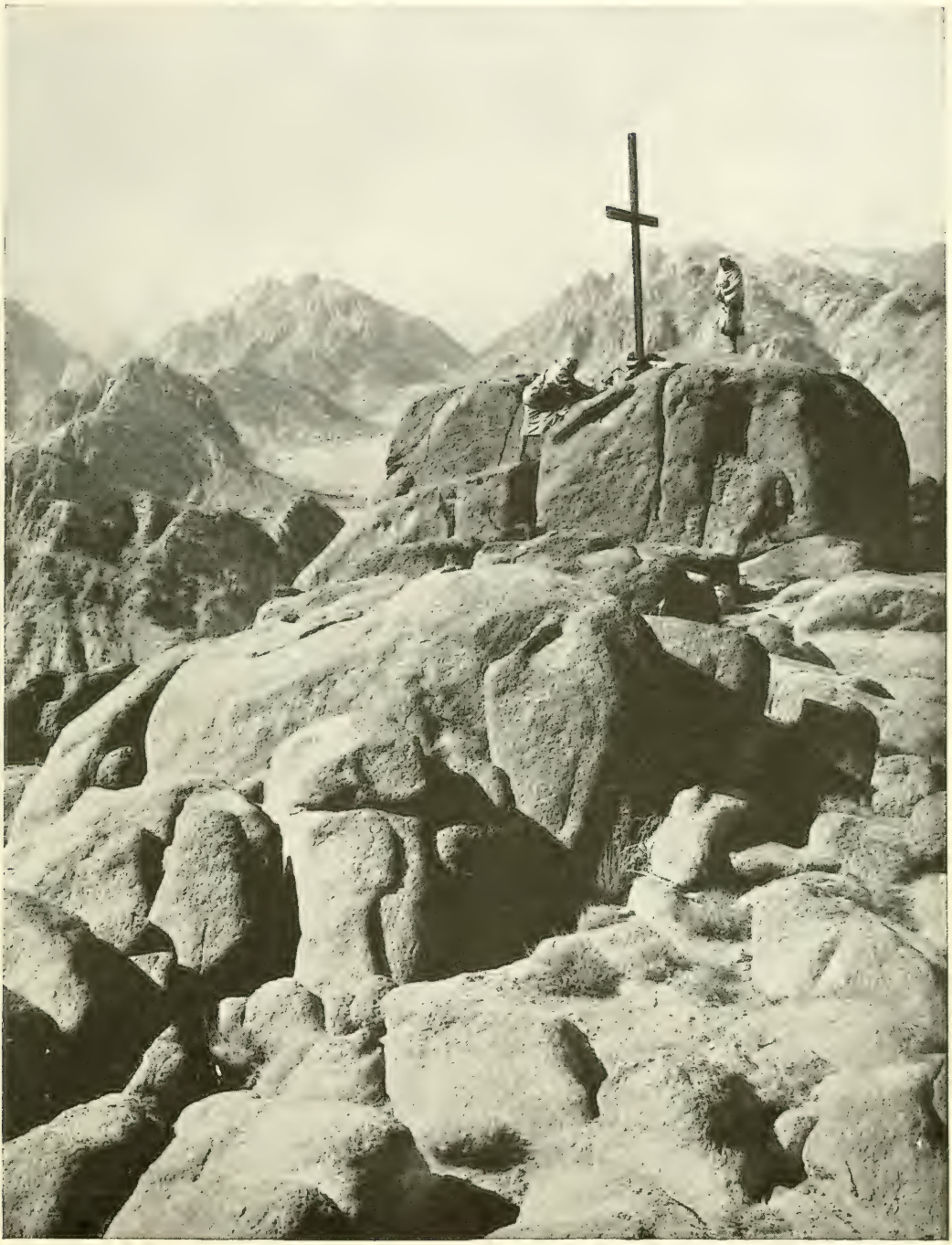
THE TOP OF SINAI

Beyond the chapel we entered another crack in the mountain side, where the pilgrim steps resume their zigzag way between high and narrow walls; but the ascent is steeper and rougher than before. After a forty-minute climb we reached the summit. Here, on a narrow platform, we found a mosque and a Christian chapel almost side by side, symbols of the two great faiths which today command the worship of so many millions of men and whose antagonisms once convulsed the Mediterranean (see page 1253).

Time was when the servants of the mosque swept the Great Sea from end to end, ravaging the shores of Spain and the littoral of France. A pope of Rome wrote pitifully for help against the raids which swept up to the very gates of the Holy City. The crumbling towers that you still see along the shores of Spain, Sardinia, Sicily, and Italy were once watch-towers, whose sentinels scanned the horizon for the slanting sails of Saracen pirates. And time was when the servants of the chapel flung their armies upon the coasts of Palestine, carried by assault the walls of Jerusalem, and planted their castles from Belfort on the north to Petra in the south, almost within sight of Sinai. Yet here on this mountain, sacred to Christian and Mohammedan alike, in silent friendliness, chapel and mosque lie side by side, as if ignorant or forgetful of the antagonisms of their servants in this world.

Our guide showed us imbedded in the rock the imprint of the hands of Moses and the cave where he had hidden when "the glory of the Lord passed by." After he was satisfied that we had seen the things of real interest on Mount Sinai, we turned to the things that were real to us. George, our Syrian waiter, seated himself upon a rock and disturbed the silence with the wailings of his flageolet, while we gave ourselves up to the view.

From our feet the gorges and chasms fell away to the valley below, through which, like a thin white thread, the road ran on to Akabah, Moab, and to distant Jerusalem. Around us stood the ring of red granite mountains—indented, worn, and carved—huge masses of fantastic cliffs. Over this ring range behind range of mountains ran away as far as the eye could see, each range as jagged and fantastic in outline as Sinai itself. In and among the ranges lay valleys of sand, shimmering like still waters, with a white and silvery gleam. The waters of the



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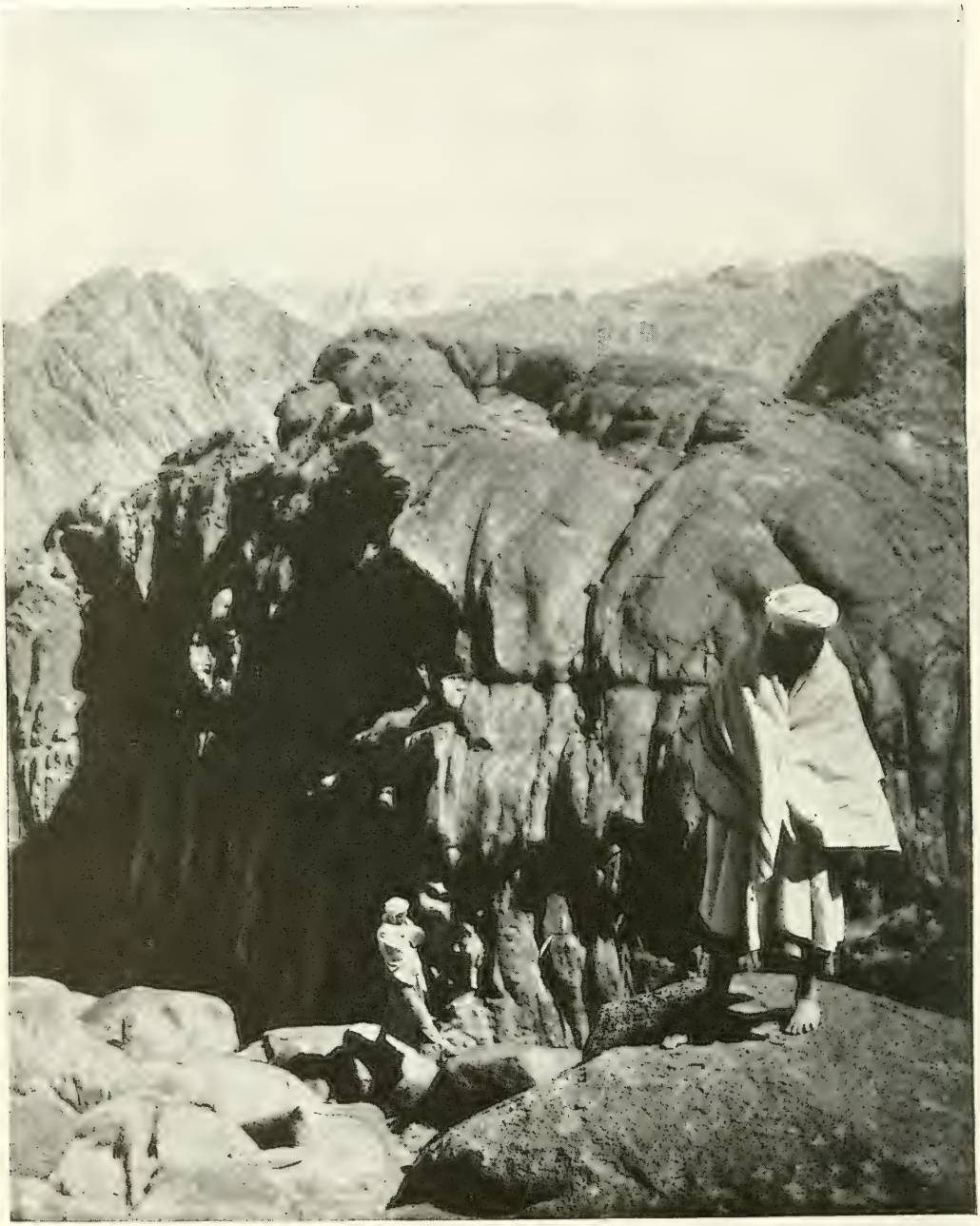
THE PLACE FROM WHICH MOSES IS BELIEVED TO HAVE PROCLAIMED TO THE CHILDREN OF ISRAEL THE COMMANDS HE HAD RECEIVED FROM JEHOVAH WHILE ON THE MOUNTAIN TOP



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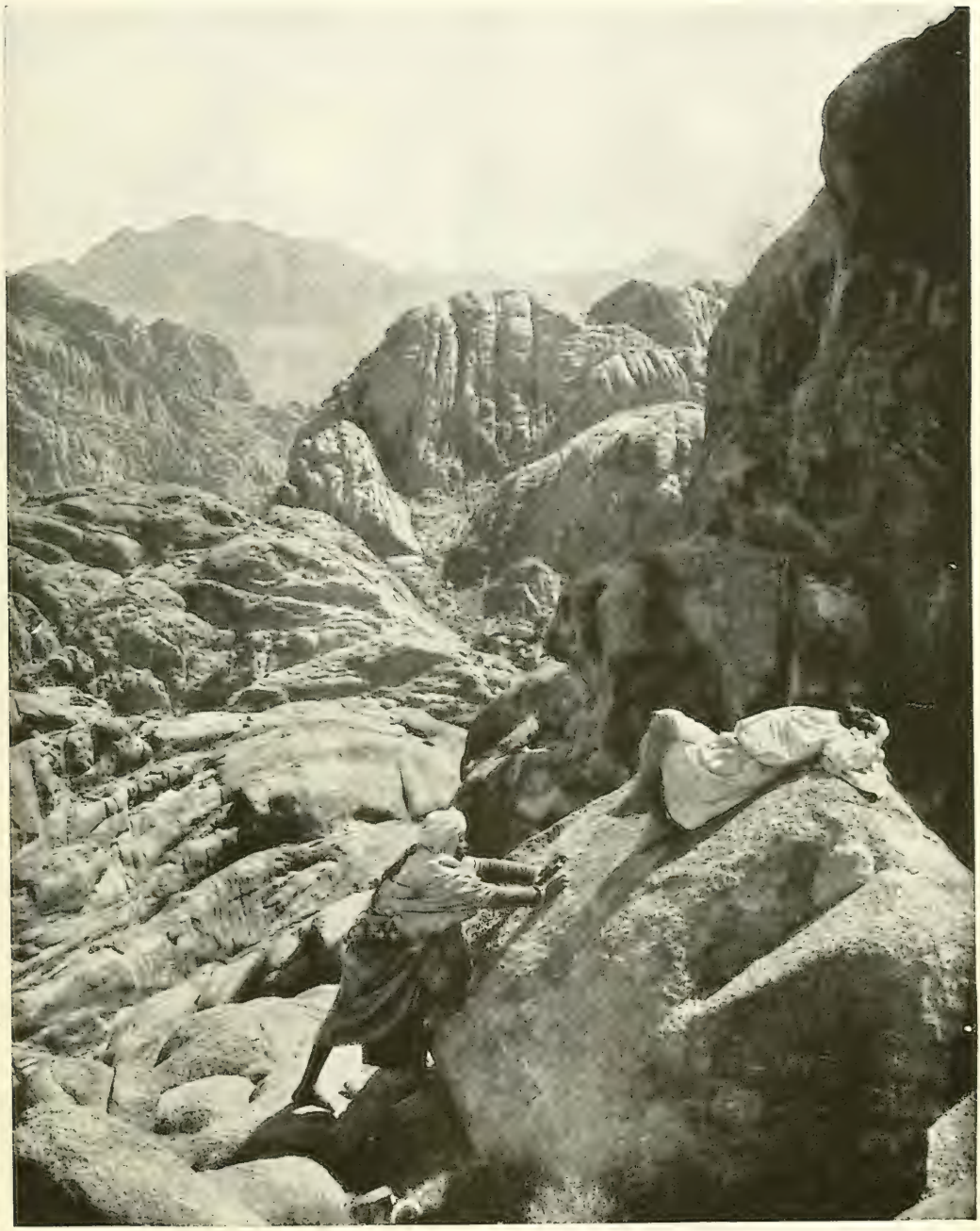
VIEW OF THE SINAI RANGE FROM THE SUMMIT OF JEBEL SAFSAFAH, WHICH IS ONE OF THE MINOR PEAKS OF "THE MOUNTAIN OF THE LAW," PEAK ST. CATHERINE (SEE PAGE 1253) BEING THE HIGHEST



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LOOKING EASTWARD FROM THE SUMMIT OF JEBEL SAFSAFAH TOWARD THE MOUNT SINAI RANGE, WHERE MOSES GAVE THE COMMANDMENTS TO THE CHOSEN PEOPLE

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BEDOUIN GARDENS IN THE RAVINE OF JEBEL SAFSAFAH

The mountain in the background is the Mount of the Law (see pages 1251, 1253, and 1256)

Gulf of Akabah were visible in several places, but the sun was setting behind the Gulf of Suez, veiling it in mist; the African mountains were crowned with gold, and over a golden sea crimson clouds were sailing. A broad band of green half encircled the northern sky, while the earth and the mountains about us were clear violet, darker in the hollows, more opalescent on the heights. Then the peaked shadow of Mount Sinai crept slowly out of the valley up the slopes of the other side; it fell upon the hills beyond, and then, stretching out to the horizon, it fell on range after range until it left the earth and threw its pyramidal shadow on the clouds.

In turn the other mountains rose, flung their shadows upon it and blotted it out. As the sun touched the horizon rim, George threw himself on his knees and, facing the setting sun, with eyes closed, poured out his soul through the reedy notes of his flageolet. The story of the "Jongleur de Notre Dame" crossed my mind. No sooner had the sun vanished than we started homeward, for the descent, difficult enough by day, is positively dangerous in the dark; but rapidly as we went the light faded faster.

In that deep gorge between the high walls the night seemed to creep up out from the rocks below rather than to fall from the skies above, and soon we gave up the attempt to see our path and trusted to the feel of the ground beneath our feet. A turn in the path and the plain of the cypress tree came in sight, lying far and almost sheer below us, for from this point begins the steepest part of the descent; but we could see our tents, the camels browsing, and the light of the camp fire, promising coffee, supper, and rest.

The stars were all out, brilliant and pendant as you never see them except very far from the cities of men; the last gleam of the daylight had faded as we stepped out of the gorge, passed the Chapel of Elijah, and came into camp. Before we slept that night, I left the tent and crossed the valley. The moon was just rising above the cliffs, throwing grotesque images of ogres and of primeval beasts upon the moonlit walls opposite; the shadow of the cypress fell black upon the face of the still waters. The silence was intense. No frogs sang to us out of the marshes; there was no voice of insects among the rocks; no call of night bird sounded in the air.

I awoke a little after 3 and dressed. The moon was still shining on the valley; the camels lay here and there, one close to the tent. George and the Bedouin were asleep around the ashes of the fire. They sprang to their feet as I came up, and George went for water,while the Bedouin, uncovering a few dull embers from under the ashes, nursed them into a blaze. The air was cold and the warmth most pleasant, and I glanced about. The desert shrubs burned fiercely, sending trails of sparks flying into the night; the firelight flickered on the walls of the tents, on the dark face of the Bedouin, and on the camel as he lay with his long neck stretched out along the ground toward the blaze. We had coffee and a cigarette, and then started again up Sinai for the sunrise. Passing the Chapel of Elijah, I heard the voice of the priest, rising and falling in weird cadences as he intoned the services of his church. Here, alone, in a monk's vigil he had passed the night.

We entered the gorge and began the climb. The moon had set in this crevice and our path lay in the shadow, but the moonlight was falling upon one side of the gorge and the rocks reflected it upon the path. Still its light was deceptive. It foreshortened distances, modulated the shadows and misinterpreted them; it created a false perspective, and I was constantly misjudging distances and stumbling, even though the light seemed ample. However, we climbed rapidly, and without stopping, for I was anxious to be on hand for the first glimmer of the dawn. In 28 minutes we stood upon the summit.

Sinai bears the name of the moon god "Sin," and "Sin" was reigning now; his light fell on the circle of granite mountains, smoothing out their cracks and scars and exalting their huge masses; here it left a valley in the darkness, and there it fell shimmering upon white sands. Overhead moon and stars hung brilliant out of a black vault of heaven, and the distances above the stars seemed vaster than the distances below.

I wrapped myself up in a steamer rug

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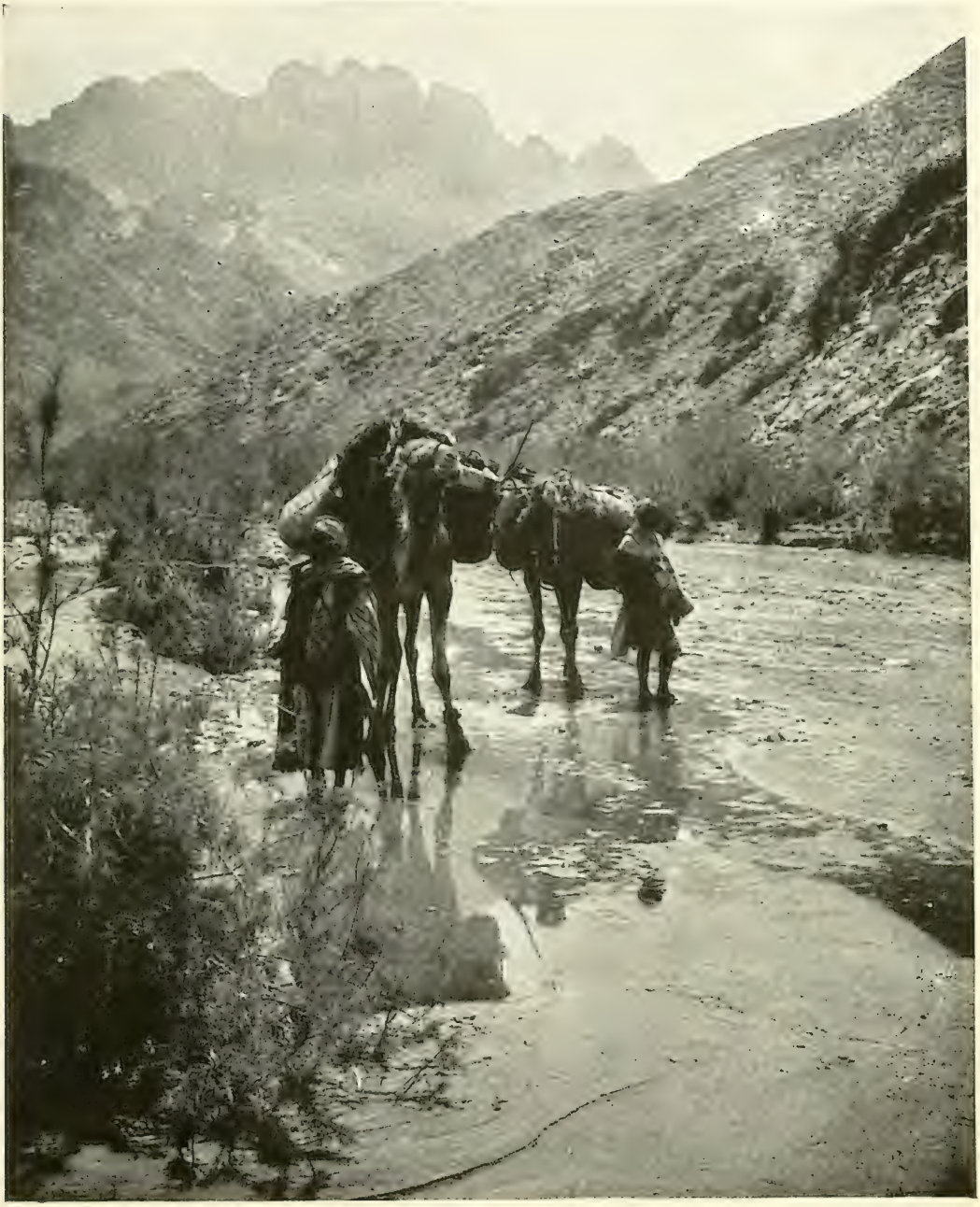
LOOKING NORTHEAST FROM THE RIGID SLOPES OF MOUNT SERBEL

The Wilderness of Sin is 3,000 feet below. The remains of old monasteries and hermits' caves abound on the slopes and rocky cliffs



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WADY (VALLEY) FIRAN: TWO MILES WEST OF THE OASIS OF FIRAN

Mount Serbel is seen towering above all the other peaks in the picture. Some historians think that it was on this mount, rather than on Jebel Musa (see pages 1251, 1253, and 1256), that Moses communed with Jehovah.

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THE MARK OF THE ELEMENTS: A STRANGELY WORN ROCK ON ONE OF THE SLOPES OF JEBEL SAFSAFAH

Photo and copyright by Underwood & Underwood

MOSES' SPRING, IN ONE OF THE RICHEST OASES OF THE SINAI PENINSULA

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JEBEL AARON, SUPPOSED TO BE THE HILL WHERE AARON SET UP THE GOLDEN CALF

It is a round hill, upon which the Moslems have erected a shrine.

"And when the people saw that Moses delayed to come down out of the mount, the people gathered themselves together unto Aaron, and said unto him, 'Up, make us gods, which shall go before us; for as for this Moses, the man that brought us up out of the land of Egypt, we wot not what is become of him.' And Aaron said unto them, 'Break off the golden earrings, which are in the ears of your wives, of your sons, and of your daughters, and bring them unto me.' And all the people brake off the golden earrings which were in their ears, and brought them unto Aaron. And he received them at their hand, and fashioned it with a graving tool, after he had made it a molten calf: and they said, 'These be thy gods, O Israel, which brought thee up out of the land of Egypt.' And when Aaron saw it, he built an altar before it." Exodus xxxii.

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TOP OF THE HILL OF THE GOLDEN CALF, WITH ITS ROUND MOHAMMEDAN CHAPEL

Behind are the lofty peaks of Jebel Safsafah of the Jebel Musa Range.

"And the Lord said unto Moses, 'Go, get thee down; for thy people, which thou broughtest out of the land of Egypt, have corrupted themselves.'" . . . "And Moses turned, and went down from the mount, and the two tables of the testimony were in his hand: the tables were written on both their sides; on the one side and on the other were they written. And the tables were the work of God, and the writing was the writing of God, graven upon the tables. . . . And it came to pass, as soon as he came nigh unto the camp, that he saw the calf, and the dancing: and Moses' anger waxed hot, and he cast the tables out of his hands, and brake them beneath the mount. And he took the calf which they had made and burnt it in the fire, and ground it to powder, and strawed it upon the water, and made the children of Israel drink of it." Exodus xxxii.

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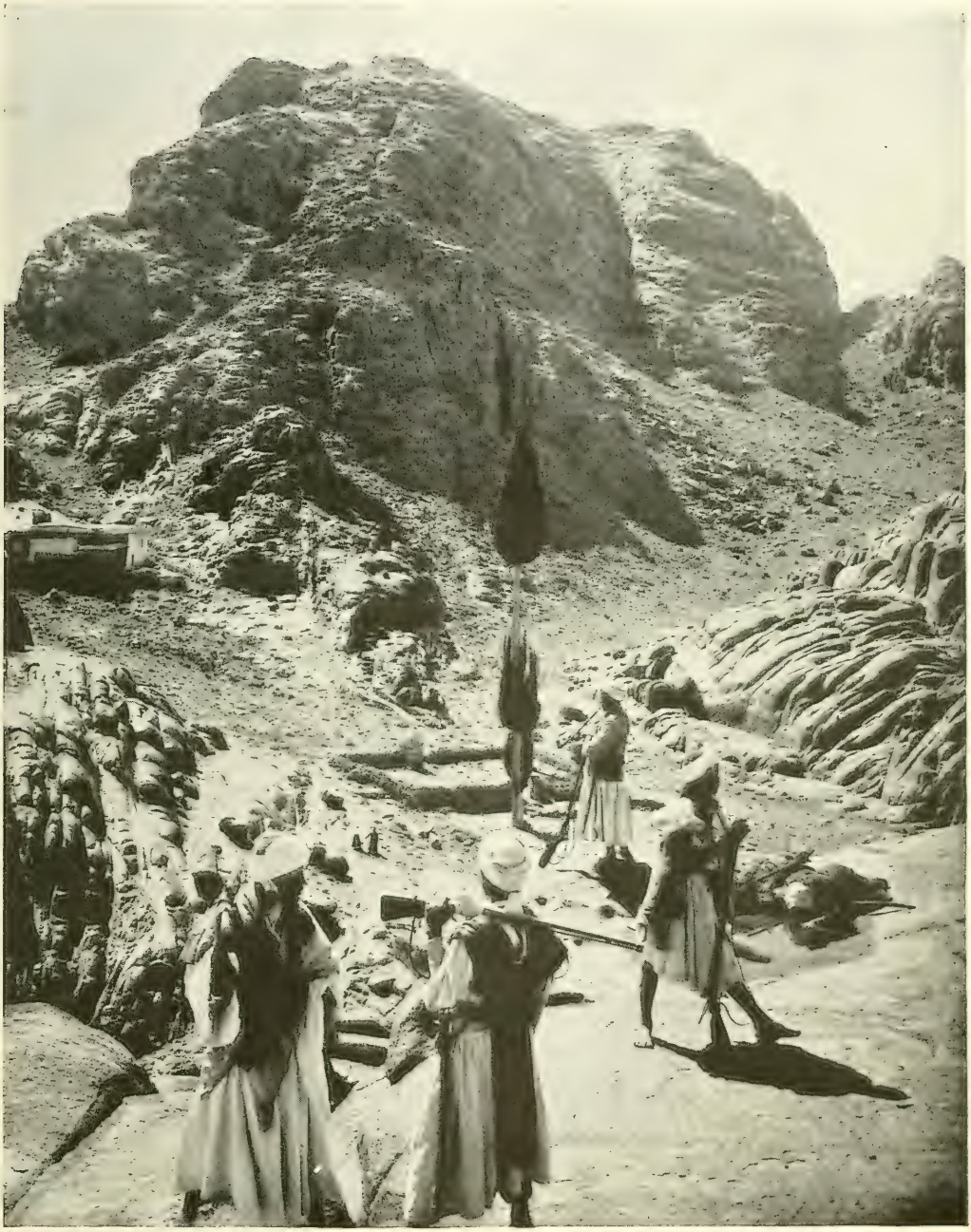
THE CHAPEL OF ELIJAH IS ON THE RIGHT OF THE SPRING OF JETHRO, WHILE IN THE MIDDLE BACKGROUND THERE STANDS A CYPRESS TREE SAID TO BE OVER 1,000 YEARS OLD



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THE DOME OF MOUNT SINAI AS SEEN FROM THE PLAIN OF CYPRESS

To the left is the Chapel of Elijah, dedicated to the prophet Elijah

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ELIJAH'S CAVE

A large Greek orthodox chapel is built over the cave which the monks keep locked. This cave is pointed out by tradition as the cave where Elijah lodged when he came to Horeb

and sat out on a ledge of rock which overhung the valley, hundreds of feet below. "Sin's" eternal enemy—the Day—was coming, and I was about to witness the battle of the gods. The faintest streak of white was creeping into the eastern sky; it broadened slowly, and crept around the horizon. Our moon-cast shadows were growing fainter; step by step "Sin" was being driven back from his own mountain. The little clouds and the morning mists, those white and fleecy sheep which Polyphemus herded in his cavern of the night, lay out along the mountain sides and down in the valleys to watch the contest.

Some tiny clouds in the eastern sky turned silver and then glowed with a white fire, while a band of pink spread around the west. The mountains began to stand forth, range beyond range, and in the uncertain light they looked like the waves of a great sea rolling in upon Sinai, and pressed forward by billowing clouds behind. Like a faint thread, the Jerusalem road crept out of the darkness that yet lingered in the valley below, a line of wavering white. The stars were fading rapidly, the moon lost her gold and turned to silver in the sky. Then the rim of the sun gleamed over the bank of clouds, a new and clearer world of shadows began to fall behind us and about us, and the day had come. The light filled the eastern valleys with a silvery haze and blotted out the Gulf of Akabah, but the Gulf of Suez came into sight, with Jebel Atakah veiled in purple and crowned with crimson.

As the sun cleared the eastern clouds, George dropped upon his knees, folded his hands, and prayed with the sunlight full upon his wrinkled face. What far-off inheritance, what ancestry of sun-worshipers spoke in the act, I doubt if he knew, and I wondered whether he himself understood the impulse that brought him to his knees.

On our way down the mountain we came again to the ledge of rock that almost overhung our camp. I saw the tents lying silent and far below; one camel was browsing near the pond, while the smoke of the camp fire was rising in the still air. As I looked one of our party threw up the flap of her tent and came out into the open. I shouted to her; she waved her arm, but her reply came back faint and unintelligible.

I stood for a second longer and turned to descend, when the mountain suddenly awoke and thundered at me, "Hello!" it roared, and then

"Hello -ello -elo-lo-lo-lo-lo-lo."

Faster and faster the echoes rolled on until all syllables were lost in a roar that died down into a muttering. It was as if some one had given a gatling the voice of a 12-inch cannon.

But the amazing thing was the length of time that had elapsed between my shout and the mountain's first reply. I sent the echoes flying again and again, awakening the mountains to unaccustomed life; but time was passing, the camp was all astir; so, throwing caution to the winds, I hastened down the steep descent.

After breakfast we left George and the Bedouin to pack up the tents and began the descent to the convent. On our way we found that a boulder had fallen in the night. Some of the steps had been crushed to powder; others had been driven from their settings, leaving gaping holes. For a thousand feet we traced that flying boulder by cracked, chipped, or broken steps, and by bright scars on the walls where fragments had caromed off. Four or five hundred feet below, we came upon a fragment of the rock that may have weighed a ton; it lay wedged in the path and we had to climb over it. Further down, the path was again blocked by the fallen rocks. It seemed as if the boulder had literally exploded, so constant were the scars it had left behind.

The wind that Elijah heard, which "rent the mountains and brake in pieces the rocks," might easily become literal fact in this gorge where run the pilgrim steps, for boulders are constantly falling, even on still nights, and any tempest of wind, tearing up between its narrow walls, would send the boulders flying.

So we came back to the convent, and another fortnight found us once more in Cairo and civilization. But the memory of the pendant stars, of the brilliant moonlight among the rocks, of the glories of the sunrise and the sunset over the mountains of Sinai, abides and does not fade.

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THE MONASTERY OF THE FORTY MARTYRS WHO WERE SLAIN BY SARACENS

It lies in a valley between huge granite walls of the Sinai Range

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THE LARGEST STREAM OF WATER IN THE SINAI PENINSULA

The rock in the background is presumably the one which Moses was directed to smite. "And all the congregation of the Children of Israel journeyed from the Wilderness of Sin, after their journeys, according to the commandment of the Lord, and pitched in Rephidim: and there was no water for the people to drink. . . . And the people murmured against Moses, and said, 'Wherefore is this that thou hast brought us up out of Egypt, to kill us and our children and our cattle with thirst?' And Moses cried unto the Lord, saying, 'What shall I do unto this people? They be almost ready to stone me.' And the Lord said unto Moses, 'Go on before the people, and take with thee of the elders of Israel; and thy rod, wherewith thou smotest the river, take in thine hand, and go. Behold I will stand before thee there upon the rock in Horeb; and thou shalt smite the rock, and there shall come water out of it, that the people may drink.' And Moses did so in the sight of the elders of Israel." Exodus xvii: 1, 3–6.

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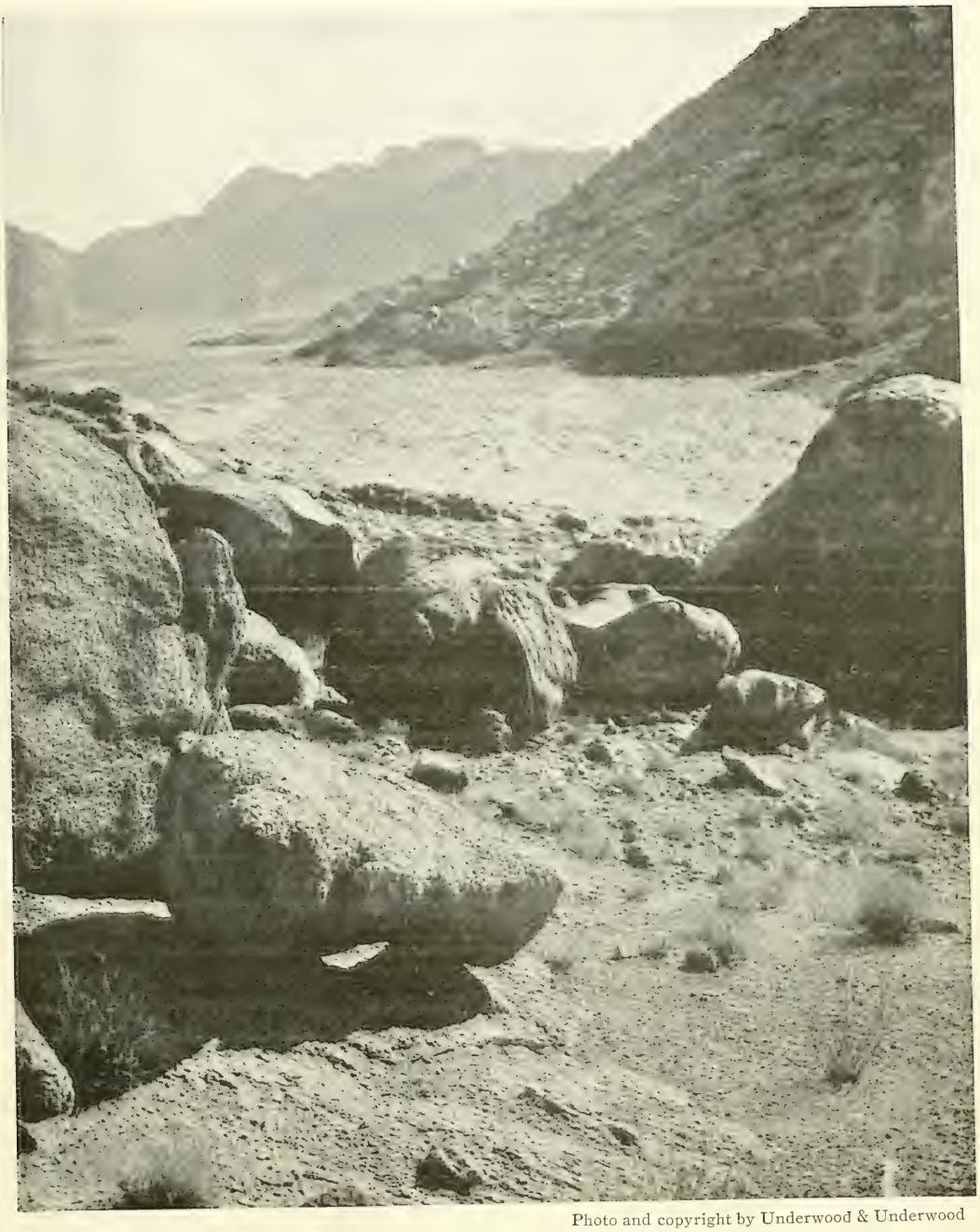
LOOKING SOUTH 1,000 FEET ABOVE THE BED OF THE VALLEY, WHERE THE BATTLE BETWEEN THE AMALEKITES AND THE HEBREWS WAS PROBABLY FOUGHT (EXODUS XVII)

It was in this region that the Children of Israel lived for 40 years. There are any one of a hundred peaks among these vales where Moses could have stood and watched the wavering conflict between the Children of Israel and the Amalekites, defending their most precious possessions of water and pasturage and ancestral camping places against the inroad of the Children of Israel when they, driven desperate by the lack of water for their families and their flocks, fought under God's guidance their way through and upward to the Promised Land.—FRANKLIN E. HOSKINS.



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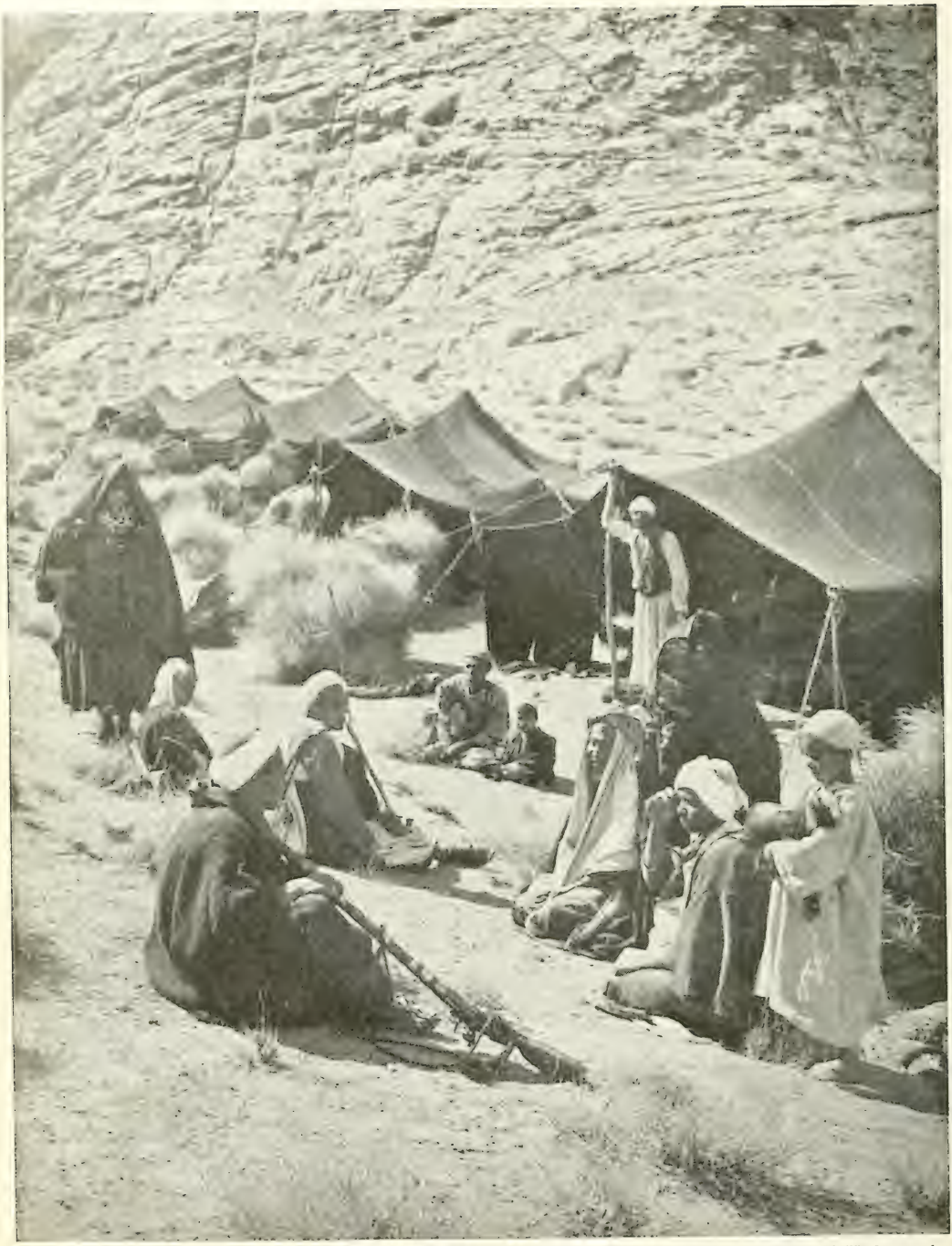
THE WADY (VALLEY) OF ESH SHEKH

The broad passage through which the Israelites must have made their way toward the Promised Land after they received the Ten Commandments at the foot of Mount Sinai



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BEDOUINS AT HOME, WITH THEIR GOAT-HAIR TENTS, IN A VALLEY IN THE SINAI COUNTRY

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A POOL IN THE DESERT

It was probably at a pool like this that Moses in his youth succored the daughters of Jethro.

"Moses fled from the face of Pharaoh, and dwelt in the land of Midian: and he sat down by a well. Now the priest of Midian had seven daughters; and they came and drew water, and filled the troughs to water their father's flock. And the shepherds came and drove them away: but Moses stood up and helped them, and watered their flock." Exodus ii: 15–17.

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BEDOUIN WOMEN WEAVING WOOLEN CLOTH : SINAI. NOTE THE HEAVY CHAINS OF BEADS, ETC., WHICH THEY WEAR

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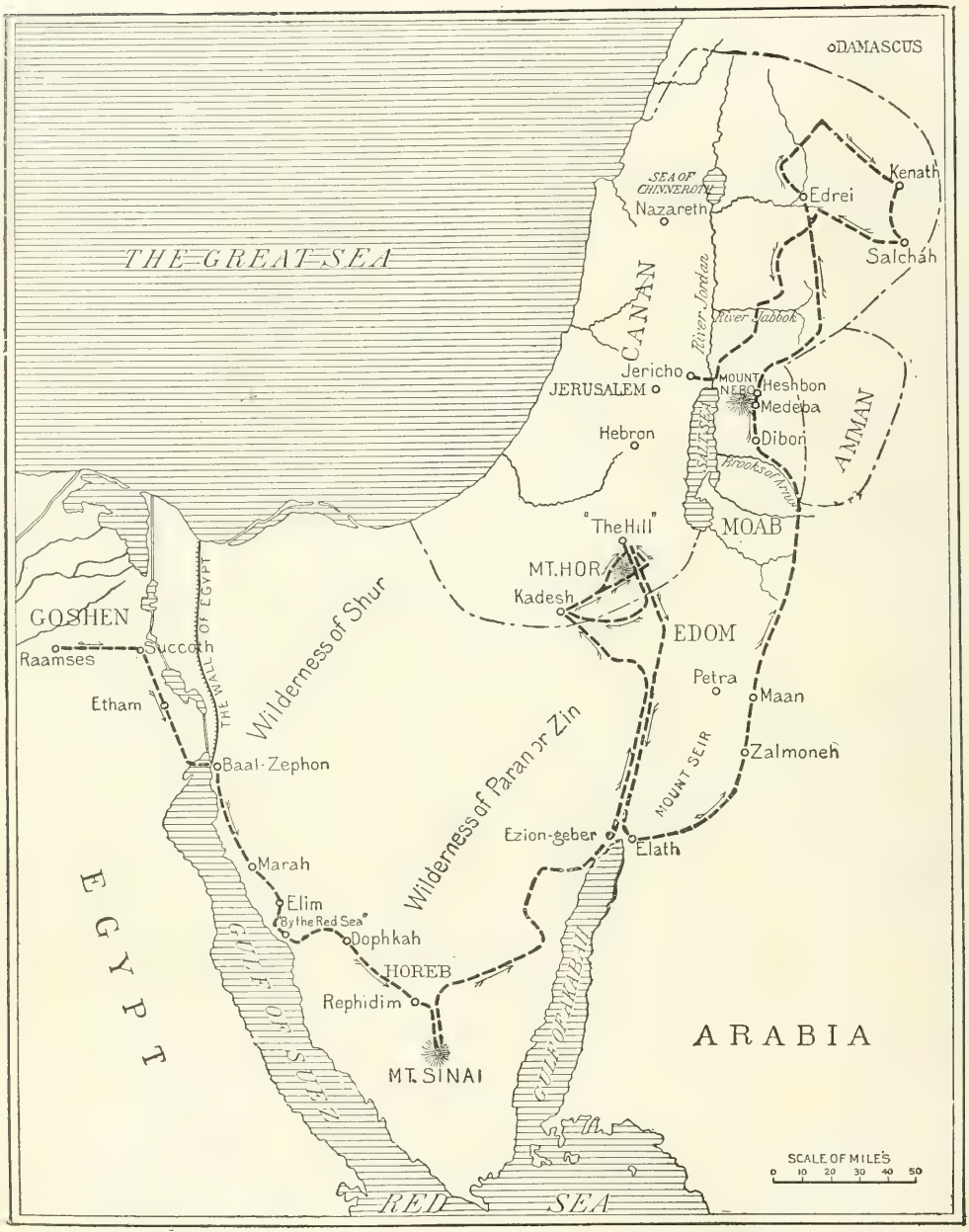
PILOTING A CARAVAN ACROSS THE HOT SANDS OF THE ARABIAN DESERT



MAP SHOWING MOUNT SINAI AND THE ROUTE OF THE EXODUS. FROM W. S. AUCHINCLOSS

For further information about the Sinai country see "The Route over which Moses led the Children of Israel out of Egypt," by Franklin E. Hoskins, D.D., in National Geographic Magazine, December, 1909.

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HADRIAN'S ARCH IN ATHENS

The Emperor Hadrian was the greatest of all the Roman benefactors of Athens. He inaugurated an era of municipal improvement, built the enormous Olympicum, and enlarged the city walls to include his new and handsome suburb of Hadrianopolis. The Arch of Hadrian shown here stood at the boundary between the old and new town.

NATIONAL GEOGRAPHIC SOCIETY

January 3.—"A Vanishing Empire." By Mr. E. M. Newman. Mr. Newman will tell of Constantinople, Salonica, Adrianople, and the other historic cities which are the center of the present Eastern War.

January 10, 4 *p. m.*—Annual Meeting. Hubbard Hall.

January 10.—"The Discovery of the South Pole." By Capt. Roald Amundsen, gold medalist of the National Geographic Society. This will be Captain Amundsen's first lecture in the United States.

January 11.—Annual Banquet. New Willard.

January 17.—"New Women in China." By Dr. Yamei Kin, the foremost woman physician in China. She is an unusually brilliant speaker and addressed the Society on her last visit to America, in 1911.

January 24.—"Hunting Big Game Across the World, from Borneo to the Rockies, including Central Africa, the British Isles, India, Canada, etc." By Mr. Cherry Kearton, of England. Mr. Kearton shows 3,000 feet of motion picture films of hunting the tiger, elephant, Indian bison, orang-outang, lion, etc.

January 31.—"Modern Greece and Montenegro." By Hon. George Higgins Moses, U. S. Minister to Greece and Montenegro, 1909-1912.

OUTLINE MAP OF AUSTRIA-HUNGARY

See articles, "East of the Adriatic," by Kenneth McKenzie, and "The Land of Contrast," by D. W. and A. S. Iddings, printed elsewhere in this number

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